

LECTURES ON FEVERS

*DELIVERED AT THE CHICAGO HOMŒOPATHIC
MEDICAL COLLEGE, WITH A FEW
ADDITIONAL LECTURES*

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TO THE
ALUMNI AND STUDENTS
OF THE
CHICAGO HOMŒOPATHIC MEDICAL COLLEGE,
IN WHOSE BEHALF
THESE LECTURES WERE WRITTEN,
THIS VOLUME
IS DEDICATED BY THEIR FRIEND,
THE AUTHOR.

PREFACE.

These lectures contain the substance of the course on Fevers, delivered in the Chicago Homœopathic Medical College to the class of 1882-83. The majority are formulated and enlarged from brief notes of extempore lectures, and are thus stripped of much of the verbiage incident to the lecture-room. The remainder were not delivered in the course, but have been added in order to make the work more complete.

They are published at the request of students and practitioners, who have been from time to time under my instruction, and who have expressed a desire to have them prepared in a convenient form for reference. They contain information derived by careful reading and study, from the different sources referred to in the Bibliography, for which I desire to acknowledge my indebtedness, combined with extensive personal observation and experience.

In every instance I have endeavored to render the exposition of all the diseases treated of, on a level with the science of our day.

I take special pleasure in expressing my obligation to my brother, H. Kippax, C. E., of the Government service, for his valuable aid in preparing the drawings for the different temperature charts and other illustrations contained in the work.

J. R. KIPPAX.

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LECTURES ON FEVERS.

LECTURE I.

INTRODUCTORY.

GENTLEMEN:—We will begin the present course of lectures on the practice of medicine, by considering the nature of that class of human ailments which have from early times been known as THE FEVERS. Special causes, more or less independent in character, and possessing vaguely defined properties, appear on the record books of the past, as operating to produce outbreaks of these maladies.

To-day, writers on febrile affections are pleased to term the morbid agents which give rise to the fevers, and to infectious and contagious diseases generally, *viruses*. The organized nature of these viruses, and the exact relation of bacteria as conveyors and originators of contagion, are the problems that are now undergoing solution.

Time, the destroyer of creeds and leveler of unfounded theories, will afford, if not to us, at least to our successors, a demonstration of the truth or falsity of the popular *parasitic theory* of the causes of infectious diseases.

The medical world has ever been in a state of unrest as to the origin of Fevers. Away back in the ages of antiquity, medical sayants found the ordinary theories entirely insufficient to account for the peculiar phenomena attending outbreaks of these diseases. Hence we find them conjuring up a "*constitutio pestilens*" or a "*genus epidemicus*," to ease their minds and explain the mystery. Astrological influences, electrical displays,

and atmospheric changes, have each and all been looked to in their time, but still in vain.

The early Roman writers unconsciously touched the key-note when they attributed the origin of malarial fevers to the entrance of low organisms into the body. But it was left to Leuwenhoek, the father of microscopy, and the Columbus of the new world of microscopic flora, to outline the bold hypothesis of a *contagium vivum*, against which no other valid objection can, after the lapse of two centuries, be raised, than that in a number of infectious and contagious diseases its existence has not as yet been absolutely demonstrated.

BACTERIA (from *bakterion*, a little rod or staff), the smallest and at the same time the simplest and lowest of all living forms, were first perceived by Leuwenhoek in 1675. They were at that time classed under the general head *infusoria*, and were for years considered as animals and placed at the foot of the series. Their correct place in the scale of organisms was given them in 1859 by M. Davaine, who first demonstrated their vegetable nature, and in 1863 made known his discovery of microscopic organisms in contagious diseases.

The positive characteristic that bacteria are not animal beings, is the fact that concentrated acetic acid, which causes all animal tissues to become pale, has no action on bacteria.

The history of these minute organisms is of more than ordinary interest to medical men, on account of their close relation to the formation and diffusion of *viruses*, and hence to the pathogeny, sanitation, and hygienic treatment of a great number of human ailments.

A short description of them here, may not be without profit.

Botanists, who have most recently occupied themselves with bacteria, define them as "cells deprived of chlorophyll, of globular, oblong or cylindrical form, sometimes sinuous and twisted, reproducing themselves exclusively by transverse division, and living in isolated or cellular families;" and though they possess affinities which approach them to the *algæ*, yet the absence of chlorophyll—which is present in the *algæ*—necessitates their being classed among the *fungi*.

They exist in their separate state in two principal forms: globular bodies, or *monads*, and bodies more or less filiform, or *bacteria*, properly so called.

M. Cohn, of Breslau, the eminent naturalist and student of inferior organisms, recognizes six genera of bacteria:

FIG. 1.



Micrococcus, ball or egg-shaped bacteria. 650 diameters. (From Microscopical Journal.)

These are the smallest bacteria, and unlike all other forms, are not characterized by periods of repose and movement.

When rapidly multiplying they are frequently found grouped in gelatinous masses.

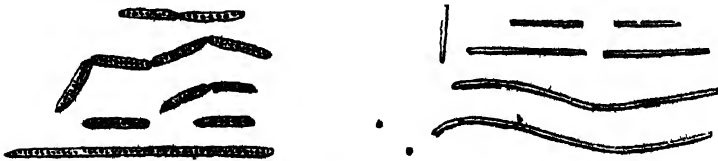
FIG. 2.



Bacterium, short, rod-like bacteria. 650 Diameters. (From Microscopical Journal.)

Magnin says, bacteria spores are the point of departure of epidemic foci, and their extreme lightness explains how readily they are disseminated by the wind.

FIG. 3.



Bacillus, straight, fibre-like bacteria. 650 Diameters. (From Microscopical Journal.)

The spirilla are the largest of the bacteria, and attain the length of two-tenths of a millimeter. (p. 310)

The filiform bacteria, and the spirilla, unlike the micrococci, are never found in gelatinous masses, but may be found in active swarms.

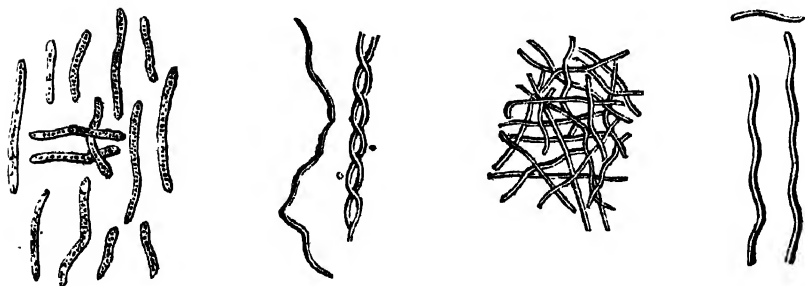
As is the case with all living organisms, bacteria possess the power of self-propagation. This is done by bi-partition or fission.

FIG. 4.



Bacillus Malariae, (after Klebs and Tommasi-Crudeli.)

FIG. 5.



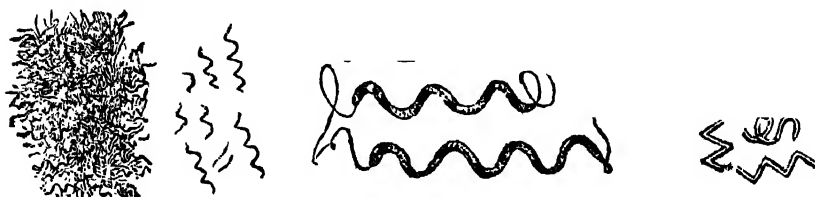
Vibrio, wavy, curl-like bacteria. 650 Diameters. (From Microscopical Journal.)

Spirochæti are long, flexible, spiral bacteria.

A great part of the whitish slime that collects on the teeth is composed of vibrios. Vibrios are also found in swarms in choleraic discharges.

When a bacterium has grown to about double its ordinary dimensions, constriction takes place at the middle and it is broken in two. Each half following the parent cell reaches matu-

FIG. 6.



Spirillum, short, screw-like bacteria. 650 Diameters. (From Microscopical Journal.)

riety in a short time, and similarly divides. So rapidly may this division be performed that in one hour the separation may be complete. Other things being equal the warmer the atmosphere the more rapidly does the division proceed. With a lowering temperature it becomes slower and slower and finally ceases at the neighborhood of the freezing point.

The bacterial germs are found to differ widely among themselves as regards their preparedness for development. And the degree of preparedness applied to either a ferment, an infection or a contagion, decides whether the hatching period shall be long or short.

Recent experiments concerning the "death-point" of bacteria have demonstrated that these organisms are capable of resisting even marked changes of temperature, provided the changes are not sudden but gradual. They will endure an elevation of temperature to 130° Fahr. or even to 176° Fahr.; and gradual freezing only benumbs them,—it does not destroy them.

And further, it may be stated that even desiccation if not too prolonged, will not kill them, but will simply arrest their activity. Their vitality is not destroyed, for under favorable conditions of moisture and warmth, this will again assert itself. The tenacity of life exhibited by the micrococci in the virus of contagious diseases well exemplifies this fact.

But here, as elsewhere in the study of Biogenesis, it is well to bear in mind the difference in resistive power possessed by the germ, and by the finished bacterium. For, other things being equal, the nearer the germ is to its finished sensitive condition, the more readily will it succumb to atmospheric changes.

Ozone affects bacteria by arresting their formation, while carbonic acid temporarily paralyzes them. Boracic acid kills them by depriving them of oxygen; and one-twentieth per cent. of carbolic acid will effectually prevent their development.

Bacteria receive their nutriment and respire by "endosmotic absorption." They require a certain amount of *water*, *oxygen*, *carbon* and *nitrogen*, as nutrient material, and a certain average degree of temperature for germination. The water they take up from the liquids in which they develop, or from the damp surfaces on which they are formed. The oxygen they take from the atmosphere; hence it follows that without free access of air there can be no life and no development. The carbon may be taken from any organic substance containing it, but not from carbonic acid. And the nitrogen may be taken in the form of either albumen or ammonia.

Bacterial forms are found everywhere, but develop in masses only when decomposition and fermentation or putrefaction are present. According to Naegeli, a distinguished German botanist, they are not the chance companions of putrefaction, but are the fungi which produce it. "Putrefaction," says Cohn, "is a chemical process excited by Bacteria. Death does not as is frequently supposed, cause putrefaction, but rather it is caused by the life of these invisible organisms."

"The whole arrangement of nature is based on this, that the body in which life has been extinguished succumbs to dissolution, in order that its material may become again serviceable to new life. If the amount of material which can be moulded into human beings is limited on earth, the same particles of material must ever be converted from dead into living bodies in an eternal circle."

A striking parallelism exists between the known phenomena of putrefaction or fermentation, and those of infectious and contagious diseases. But, at the same time, there is an acknowl-

edged difference between the bacteria of contagion and the bacteria of putrefaction. The former are distinguished by their different form, size, and habits of life. Oftentimes they battle for existence with the putrefaction bacteria and are by them exterminated if they are conquered.

Declat alludes to this parallelism when he says, "the role of bacteria is not limited to putrefaction. They also invade the living organism and bring in their attack the double character of infinite smallness in their apparent means and powerful destructive energy in the results. From this source come diseases of which man not long since did not know the cause, and which he only commences to refer to their veritable origin. For those who are *'au courant* with the first steps which she has made in this new line of research, with the fecundity of her first glimpses, with the richness of her first results, it is not doubtful that she will soon succeed in demonstrating the parasitic nature of the gravest epidemic maladies."

Our atmosphere contains few, if any, adult bacteria, but always more or less permanent spores, which float in groups or clouds, and are presumed to have escaped from sporogenous filaments of the bacteria.

These ultra-microscopic germs or *particles*,* possessed with a power of flotation commensurate with their smallness and lightness, are the supposed origin of all bacterial life.

Miquel found that the average number of microbes in the air is feeble in winter, and augments rapidly in the spring. Rain always diminishes the number of true microbes.

Water contains considerable quantities of bacteria, and more especially of germinal particles. The water of our rivers and lakes is always fecund and may give birth to several species of bacteria. The only waters which do not contain them are those drawn from the very source of the spring, as our artesian and mineral spring waters.

The weight of a bacterium has been calculated at 0.000,000,001,57 milligram. This extreme lightness suggests a possible explanation of the occasional appearance of new diseases in the world. Prof. Colm considers it not unreasonable to suppose

* A *particle* has been defined as "a bit of liquid or solid matter, formed by the aggregation of atoms or molecules." An atom or molecule if free, is always part of a gas, the particle is never so.

that small particles of bacterial dust may, while floating in the atmosphere, be carried up by ascending currents of air beyond the attraction of our planet and wander into space, and though chilled by floating for an indefinite time through space, it is possible for these particles to at last reach the atmosphere of other worlds and find there conditions favorable to their development, multiplication and growth.

Reversing the order it is not more unreasonable to suppose that germs or particles carried beyond the attraction of other worlds may, after moving about in space, eventually reach our atmosphere, and finding it congenial to their development, multiply and fill the earth.

Passing from this desultory description of bacterial life in general, to a more direct consideration of the position it occupies in the causation of infectious and contagious maladies, let me say to you that we have as yet little positive knowledge, but trust the future is pregnant with corroborative facts. That advanced guard of the medical profession—its successful workers and profound thinkers—are busy night and day at the chaos, and even now the light begins to dawn. In their experiments on septicæmia Coze and Feltz were driven to admit that “there is a direct relation between the infectious accidents and the foreign organisms (micrococci) which play in the blood the role of ferments and reproduce themselves.” Pasteur, the accomplished French experimenter, justly claims the honor of being the first to suggest the possibility of the parasitic nature of septicæmia.

Dr. Eklund, of Stockholm, found flat, oval or rounded sporoidal cells, termed *plax scindens* in the urine and blood of scarlet fever patients. The *plax scindens* multiplies as do bacteria in general, and belongs to the order of schizomycetes or cleft-fungi as adopted by Naegeli. These cellular bodies are peculiar to scarlet fever, and are not found in any other disease. (p. 405).

Bacteriform elements have been discovered in the nasal mucus of measles during the stage of invasion, and active, slender rods have been unmistakably noticed in the blood of patients suffering from this disease. The parasitic nature of diphtheria is to-day acknowledged by all. But it is yet a mooted question whether a bacterium or a micrococcus is the agent of contagion. The bacillus anthracis has been definitely outlined as the cause

of charbon. The virulence of variola has been attributed to a bacterium, though the majority of testimony corroborates the demonstrations of Chauveau and Klebs, which outline it as micrococcus.

Tigri first demonstrated the presence of bacteria in the blood of typhoid fever patients, and more recently Klebs and Eberth have found a bacillus which they claim to be the specific virus. The latter observers found rod-shaped organisms smaller than those of anthrax, in the lymphatic glands and vessels in the vicinity of typhoid ulcers.

Coze and Feltz have shown by experimentation that inoculation with the blood of typhoid fever produced in rabbits the characteristic pathological condition in the glands of Peyer.

The micrococci frequently found in the dejecta of typhoid fever patients cannot be held as characteristic, as they are frequently seen in the fæces of healthy individuals.

Obermeier in 1868 discovered certain wavy, thread-like bodies, called spirilla, in the blood of relapsing fever patients during the access of the fever.

Neisser, of Leipsic, has discovered a very small bacillus in the nodes of the skin in leprosy, and has further discovered micrococci in the specific virus of gonorrhœa. A form of schizomycetes or cleft-fungi has been detected in the pia mater of cerebro-spinal fever victims.

Gerber and Birsch-Hirschfelder have recently found bacterial corpuscles covering the valves of the heart in ulcerative endocarditis. Von Recklinghausen and Lukomsky have discovered a micro-organism in erysipelas. And Friedlander, of Berlin, the latest investigator as to pneumonia, has found micro-organisms in that disease. The latter describes ellipsoidal micrococci about a micro-millimeter in length, and one-third less in breadth, arranged in pairs or long chains, as being specially abundant during the stage of red hepatization.

Koch, Toussaint and Watson Cheyne, have recently discovered the true micro-organism which induces tubercular diseases. They describe the tubercle bacillus as being more slender and pointed than the leprosy bacillus, and as having a length of from one-third to one-half the diameter of a red corpuscle. These bacilli develop most rapidly at a temperature of from 86° Fahr. to 106° Fahr., and in this respect differ markedly from the

bacilli of splenic fever which develop rapidly at low temperatures.

Professors Klebs and Tommassi-Crudeli, of Rome, Italy, claim to have found the malarial microbe—the true bacillus malariae. But the recent experiments of Dr. Sternberg, with malaria, in the vicinity of New Orleans, appear to only partially support their statements. The former found the bacillus malariae not only in malarial soil, but also in the blood of patients suffering from intermittent fever.

From these results of a few of the experiments made during the last decade, you will readily understand why the parasitic theory of the origin of infectious and contagious diseases as opposed to the physiologic-chemical, is rapidly gaining support. The physiologic-chemical theory, which is supported mainly by negative argument, maintains that chemical changes take place in the system, producing morbid results, after the introduction of the infectious elements into the blood, upon the principle of catalysis.

The germ or parasitic theory maintains that the infectious and contagious poisons are living organisms which, being introduced into the blood, develop and reproduce themselves, and by their development and reproduction give rise to morbid changes and groups of symptoms, that are characteristic of types of disease. Owing to the present uncertain state of medical knowledge, and the absence of positive evidence as to the exact nature and habits of these organisms, advocates of the germ theory are themselves divided on the unity or multiplicity of pathogenic fungi.

One school, at the head of which stands Naegeli, of Munich, holds that the same species of fungi, differing in form through various generations, both morphologically and physiologically, may cause the different infectious and contagious diseases. This belief is based principally on the experiments of Buchner and Pasteur, who believed that by repeated propagation the virulent bacillus anthracis could be changed into a harmless hay bacillus, and reversely that the harmless bacillus foeni could, by repeated propagation and culture, be made to possess the virulent properties of the bacillus anthracis. The recent labors of Koch and his pupils have, however, thrown great discredit on these experiments by demonstrating that Buchner was not sufficiently careful in making them. For, by repeated experiments

the former were able to propagate either bacillus indefinitely, without in the slightest degree changing its nature.

The other school, which is rapidly gaining adherents, and has suddenly become the popular one of to-day, holds that each infectious or contagious disease has its virus in a well-defined and separate germ, capable of reproducing itself under favorable conditions, and always causing the same morbid changes, and producing invariably the same distinct specific disease.

Clinical experience bears us out in giving greater credence to the theory of this latter school. For as far back as we have any authentic records, small-pox has always been small-pox, and has ever been described as having the same general symptoms which characterize it to-day. So it has been with scarlet fever; and so it is with measles and the rest. As surely as the mustard plant arises from the mustard seed, as surely as the oat springs from oat, the peach from the peach, and oaks from little acorns grow, so surely does the small-pox virus (or seed) increase and multiply into small-pox, the scarlet fever virus into scarlet fever, and the typhoid virus into typhoid fever. True it may be that some symptoms of these maladies may appear more prominent in certain epidemics than in others, and that in the course of time certain infectious diseases may have become somewhat modified; yet it is equally true that the characteristics of these diseases have always remained the same, and that one infectious or contagious disease has never been known to be transformed into another. Could different forms of the same fungus cause these varied ailments, it would be a rational expectation that changes from one form to another might take place in the body of the patient, that a case beginning as measles might end, say as scarlet fever, or perchance small-pox, and that an epidemic might readily change its nature during any part of its course. Suffice it to affirm that from the dim twilight of antiquity down to the present time no such transition has ever been observed.

No more striking evidence in favor of the parasitic theory in general, and of the specific nature of the separate pathogenic germs in particular can be brought forward, than the possession of fixed incubation periods by many infectious and contagious diseases. The quantity of the virus introduced cannot be the cause of the appearance of measles on from the 9th to the 11th

day after the infection, or of the appearance of scarlet fever on from the 4th to the 7th day, or of small-pox on from the 10th to the 13th day. More probable is it that the virus needs this time, after introduction into the system, to develop into a morbid agent. And in the further progress of the disease it is also probable that a portion of the energy of the virus consists in its passage from the germ state or particle to that of the finished organism.

Cohnheim has observed that anthrax gives no outward manifestation of its presence until the spores have developed into bacilli, and that in trichiniasis, the fever and the myalgia are not noticeable until the intestinal trichinæ have developed from those eaten with the infected meat, and from these a new generation has been hatched. According to this view, Tyndall defines a contagious disease as "a conflict between the person smitten by it and a specific organism which multiplies at his expense, appropriating his air and moisture, disintegrating his tissues, or poisoning him by decompositions incident to its growth."

In this connection and at this time, it will not be necessary to give more than a passing notice to the once popular but now antiquated theory of spontaneous generation—a theory which, though born with Aristotle and mouldy with age, never has and never can admit of experimental proof. Few are the scientists who to-day believe in the possibility of physical conditions ever operating to evolve living beings from absolutely dead organic matter. That life cannot, at least in this age, arise independently of pre-existing life, has become almost a truism. The day of belief in vitiated air, foul drains and fœtid odors as originators of disease is rapidly passing by. We now look upon defective drains and cesspools, and a corrupt atmosphere, potent distributors of disease only when the special germ of epidemic disorder is present. And notwithstanding this, sanitary science will demand as much, if not more, attention of the physician as it has in the past. For though bad air and foul drains cannot create disease germs, they possess the power of pushing the latter into virulent energy of reproduction, and thereby promote the spread of disease, suffering and death.

"Consider," says Tyndall, speaking of the floating dust of the air, "consider the woes which these wafted particles, during historic and pre-historic ages, have inflicted on mankind; con-

sider the slaughter which has hitherto followed that of the battlefield, when those bacterial destroyers are let loose, often producing a mortality far greater than that of battle itself; add to this the other conception that in times of epidemic disease the self-same floating matter has mingled with it the special germs which produce the epidemic, being thus enabled to sow pestilence and death over nations and continents. Consider all this and you will come with me to the conclusion that all the havoc of war ten times multiplied would be evanescent if compared with the ravages due to atmospheric dust. This preventible destruction is going on to-day, and it has been permitted to go on for ages, without a whisper of information regarding its cause being vouchsafed to a suffering, sentient world. We have been scourged by invisible thongs, attacked from impenetrable ambushes, and it is only to-day that the light of science is being let in upon the murderous dominion of our foes. From the vantage ground already won we look forward with confident hope to the triumph of medical art over scenes of misery and woe."

Classification of Fevers.—Leaving the general causation of this group of diseases, we will proceed to their classification. And though a classification from the parasitic standpoint will be the classification of the future, the want of a better knowledge of the different kinds of microphytes forbids our formulating it to-day. So, following the classification heretofore adopted in our lectures in this college, we will for convenience of study, divide the fevers into the following classes: Miasmatic or Infectious, Miasmatic-Contagious or Contagious-Infectious, and Contagious.

Miasmatic, Malarial or Infectious Fevers are those fevers which are caused by a morbid agent, called a miasm or infection, developed exterior to the physical organism. A miasm or infection is a virus developed exterior to the body, usually in connection with decomposing organic matter, and is capable of being diffused through air or water. Miasmatic fevers cannot be conveyed from a diseased to a sound individual, but may recur frequently.

Miasmatic-Contagious or Contagious-Infectious Fevers, are those fevers which are caused by a morbid agent developed within a diseased organism, but matured and reproduced ex-

terior to it in connection with decomposing organic matter. Miasmatic-Contagious fevers cannot be conveyed directly from the sick to the healthy, but only by the excretions, and by these but feebly, until the specific germs have become matured and luxuriant from contact with decomposing animal and vegetable matter outside the diseased organism.

Contagious Fevers are those fevers which are caused by a morbid agent developed, matured and reproduced, entirely within a diseased physical organism.

A contagion is a virus which has its origin only in a living being, and is capable of being carried from one individual to another. Contagious fevers can be conveyed either through the atmosphere, or directly from the sick to the healthy; and they attack the organism usually but once.

Following this classification we will arrange the fevers as follows.

FIRST CLASS.—(*Miasmatic.*)

- | | |
|------------------------|---------------------------|
| I.—Intermittent Fever. | IV.—Typho-Malarial Fever. |
| II.—Remittent Fever. | V.—Dengue Fever. |
| III.—Pernicious Fever. | VI.—Hay Fever. |

SECOND CLASS.—(*Miasmatic-Contagious.*)

- | | |
|-------------------|----------------------------|
| I.—Typhoid Fever. | III.—Cerebro-spinal Fever. |
| II.—Yellow Fever. | IV.—Influenza. |

THIRD CLASS.—(*Contagious.*)

- | | |
|-------------------------------|----------------------|
| I.—Typhus Fever. | V.—Miliary Fever. |
| II.—Relapsing Fever. | VI.—Measles. |
| III.—Small-pox and Varioloid. | VII.—German Measles. |
| IV.—Varicella. | VIII.—Scarlet Fever. |

All these different forms of febrile affections may be either epidemic or endemic, but they are seldom, if ever, sporadic. They are said to be epidemic, when they attack numerous individuals at the same time and in the same way; endemic, when they appear continuously in the same district, and sporadic when they attack individuals without regard to time and place.

LECTURE II.

Simple Continued Fever.

I shall this morning, before taking up the history of miasmatic diseases, direct your attention to a fever which does not admit of a place in our classification, and yet is frequently met with in practice. I allude to Simple Continued Fever.

Definition.—This may be defined to be a non-specific continued fever, which runs its course in a few days, and terminates in rapid convalescence, presenting no characteristic lesion.

Synonyms.—It has been variously known and described as ephemeral fever, inflammatory fever, sun fever, and heat fever. Formerly the name simple continued fever was used as a cloak to cover the transient and unmasked, the uncertain and the abortive cases of fever, that might occur during any epidemic. But to-day it is narrowed down, so as to include only those cases of continued fever, of whatever length, that are of non-specific origin, and are non-symptomatic.

Etiology.—The causes of this fever are numerous. Among them we may mention exposure to extremes of heat and cold, over-feeding, emotional excitement, and excessive mental or physical fatigue. It occurs more frequently during the summer season, and prevails more among children than adults.

Clinical History.—Simple continued fever presents no premonitory symptoms. The onset is abrupt. The fever asserts

its presence by feelings of lassitude and chilliness, followed by a sudden rise in temperature. The skin becomes hot, the pulse rapid, and the thirst excessive. More or less headache and pain in the limbs are present from the beginning of the attack. The bowels are generally constipated, and the urine is diminished in quantity, high-colored, and of high specific gravity. The tongue is covered with a white coating, and the appetite is either lessened or lost. Vomiting is rarely present unless the attack is brought on by over-feeding.

The temperature rise is soon at its height, and may reach 103° Fahr., or even 105° Fahr., in a few hours. Usually the fever is of short duration, and convalescence is almost always correspondingly rapid.

The temperature fall may be either sudden or gradual. The fever may terminate in twenty-four hours with a copious perspiration, by a critical discharge from the bowels, or by a large deposit of urates in the urine. Or it may take from two to ten days to run its course, and end by gradual defervescence.

Simple continued fever presents no characteristic eruption, though herpes may be said to occasionally attend it. It is mainly characterized by the sudden onset of the fever, and the rapidity with which the maximum temperature is reached.

Wilson, following Murchison, describes four different varieties of this form of fever:

1. The *ephemeral* variety, which is ushered in suddenly with chills, or alternate chills and flushes, followed by high fever, intense headache, and a quick, full pulse. The skin is hot and the urine scanty and high-colored. The tongue is coated white, and there are anorexia and constipation. Great pain in the limbs, as from a bruise, is a frequent symptom. An attack reaches its acme at night, and usually lasts from twelve to thirty-six hours.

2. The *synochal* variety, sometimes called and described as inflammatory fever. In this form the fever runs high, and the pulse is full and bounding. The skin is intensely hot, the headache severe, and occasionally accompanied with delirium. This variety runs a longer course than does the ephemeral, and is apt to terminate abruptly with copious perspiration.

3. The *ardent continued fever* of the tropics, which occurs mostly during hot, dry weather, among non-acclimated,

plethoric, young individuals. An attack is generally ushered in with a chill, or nausea and vomiting, followed by a high fever, quick full pulse, hot skin, intense headache, and great restlessness. Active delirium is apt to appear about the fourth or fifth day, and may be followed by unconsciousness or at times coma. Convalescence, marked by a copious perspiration and an increased flow of urine, may set in between the sixth and ninth days, or death may take place from a continuance of the coma, or from sudden collapse following the subsidence of the fever.

4. *Asthenic simple fever.* This form tends to follow excessive bodily or mental fatigue, and lasts from two to three weeks. The fever is less marked, and the temperature rise less sudden than in the other varieties. The pulse is generally quick but feeble. The tongue is apt to be somewhat coated, and the bowels constipated. At night the sleep is more or less disturbed, and is frequently followed by a slight headache during the waking hours. And although the strength of the patient gradually fails as the fever runs its course, asthenic simple fever seldom, if ever, terminates fatally.

The Duration.—The ephemeral variety, which occurs mostly in children, often runs its course in a few hours. Mild forms of simple continued fever have in temperate climates an average duration of from three to six days. And the asthenic variety, which is characterized by less active fever, may continue two or three weeks.

ANALYSIS OF CHART.

The Temperature.—A sudden rise of temperature to 103° Fahr., or 105° Fahr., is, as has been suggested, the characteristic symptom of simple continued fever. In mild cases the fall during convalescence, though sudden, is never so rapid as is the rise, during the onset of the fever. Severe cases, or those of longer duration, are marked by a more gradual defervescence.

The Pulse.—The pulse is quick, full, and bounding, in all varieties except the asthenic, in which it is quick and feeble.

The Nervous System.—Chills and rigors, followed by headache, usually usher in the initial stage. The headache is acute, and may be followed by delirium. In the ardent variety the delirium may lead to stupor, coma and death.

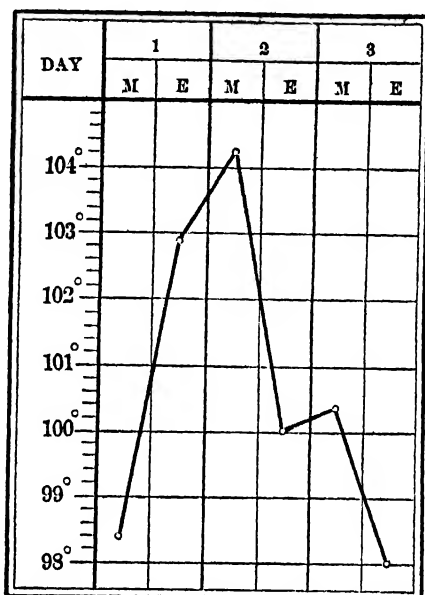
The Alimentary Tract.—The appetite is generally lost, and

CHART I.—*Simple Continued Fever.*

Forms :	Ephemeral,	Inflammatory,	Ardent,	Asthenic.
Duration:	2 days,	3 to 5 or 10 days,	7 to 10 days,	14 to 21 days.
Causes:	Exposure, fatigue and over-feeding.			
Initial Symptoms:	Chills and rigors,		Chill, or nausea and vomiting,	Lassitude and anorexia.
Temperature:	Sudden rise to 103° Fahr. or 105° Fahr.			99° to 102°.
Pulse:	Quick and full,	Full and bounding,	Frequent and full.	Frequent and feeble.
Head:	Intense headache,	Sharp headache,	Intense headache, delirium, coma,	Slight headache.
Tongue:	White coating,			Slightly furred.
Stomach:	Thirst and loss of appetite,		Nausea and vomiting,	Anorexia.
Intestinal Canal:	Constipation.			
Urine:	Scanty, high colored, copious deposit of urates during convalescence.			
Extremities	Pains as from a bruise.			
Skin:	Intensely hot, copious perspiration during convalescence.			
Prognosis:	Favorable,		Guarded,	Favorable.

thirst is quite marked. Vomiting is rarely present. The bowels are usually constipated.

FIG. 7.



Temperature in Simple Continued Fever (Wunderlich.)

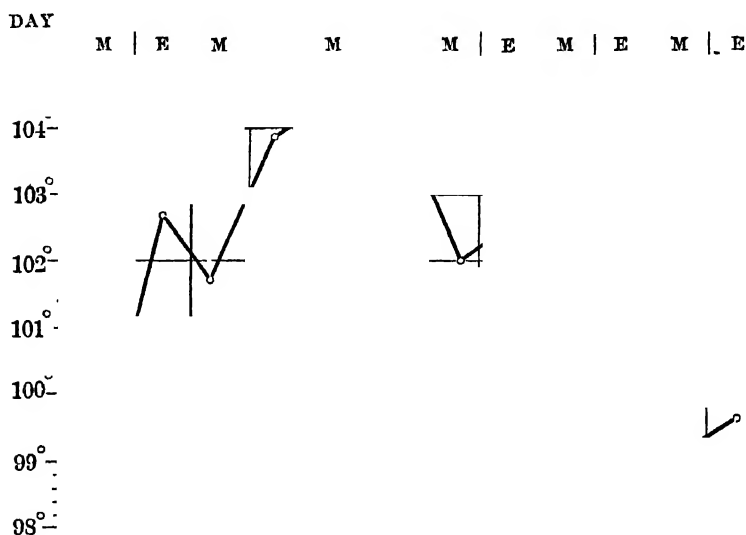
The Urine.—The urine is characteristically “febrile” and is diminished in quantity. It contains a large quantity of urea, and is of high specific gravity, varying during the fever from 1030 to 1035. During defervescence the quantity of urine rapidly increases, and a copious deposit of urates takes place.

The Cutaneous Surface.—The skin is hot and dry, and occasionally erythematous. Herpes is sometimes present upon the lips and nose.

Diagnosis.—The diagnosis, though at times obscure, may as a rule be outlined with a certain degree of accuracy. When differentiating it from other fevers it is well to remember that simple continued fever may occur sporadically, at times when no epidemic is prevailing. The majority of the fevers are either epidemic or endemic. Simple continued fever is oftener caused by over-exertion, over-feeding, or over-heating. It begins abruptly, and is marked by a rapid temperature rise. This, along with the absence of an eruption, and of abdominal symptoms,

should be sufficient to differentiate it from typhoid fever. And the freedom from jaundice, from pains in the joints, and from enlargement of the liver and spleen, as well as the absence of spirilla in the blood, ought to differentiate it from relapsing or spirillum fever.

FIG. 8.



Temperature in Simple Continued Fever: more gradual deconvalescence (Wunderlich.)

Prognosis.—In temperate climates the prognosis is generally favorable, as the disease tends to recovery. In tropical regions, however, the prognosis is more grave, and death is not an uncommon occurrence.

Treatment.—The diet should be light and non-stimulating for the milder forms, except in the latter stage of the asthenic, when a supporting diet is necessary. Milk, blanc-mange, and light broths prove all-sufficient. In long lasting cases, koumyss, whey, and egg-nog may be added. Water should form the principal beverage. When fever is high, broken ice on the tongue is very grateful. Cold water sponging adds greatly to the comfort of the patient, and in severe cases the pack may be resorted to with benefit.

Aconite.—The therapeutics of simple continued fever may be expressed in few words. In the ephemeral variety we need no other remedy than aconite. And in the ardent variety, according to our East India confreres, it is a most potent aid. It is specially indicated when the pulse is very quick, hard and sharp.

Camphor may be useful during the first hours of the fever, especially when the attack is caused by exposure to sudden changes of temperature.

Gelsemium is indicated when taking cold is the cause, and there is great nervous restlessness, with a quick, large, soft pulse.

Veratrum vir. is adapted to all forms, with the exception of the asthenic. It is particularly beneficial when there is a hard, full, quick, bounding, incompressible pulse, with headache, dimness of vision, nausea, and extreme restlessness.

Bryonia is called for when the shooting pains in the limbs prove distressing to the patient, and especially when accompanied by a heavy, stupefying headache, aggravated by motion. The bryonia fever is mostly caused by cold or error in diet, or comes on during hot summer weather. It seldom runs as high as does the aconite or veratrum fever. The tongue may be coated yellow or thinly covered with mucus, and the taste is flat and pasty.

Arsenicum alb. will be of use in prolonged cases, and when there is great prostration.

Belladonna may be occasionally indicated for the cerebral symptoms.

For further therapeutic indications I will refer you to the treatment of intermittent and typho-malarial fevers.

Malarial Fevers.

With this digression we will proceed to the consideration of the *malarial* or *miasmatic fevers*—the first in order of classification. The many varieties of this class of fevers have a common origin in a morbid agent, which has, by gen-

eral consent, received the name of *miasm*. They present many symptoms and conditions which serve to outline the class, and yet are attended by phenomena so widely different in character as to necessitate their being regarded as distinct diseases. The severity and type of fever are determined, other things being equal, by the amount of *miasm* operating at any given time, and the presence or absence of conditions favoring its development. The more intense and concentrated the malarial poison, and the more prolonged the exposure to its influence, the more rapid will be the development, and the greater the extent of the morbid processes. Arranged in a progressive scale, marked by the quantity and intensity of the *miasm*, we may begin with the quartan intermittent, and ascend to the tertian; go still higher to the double tertian and the remittent, and at last reach the pernicious. The more severe types are apt to be encountered in the tropics, and the lighter prevail the farther we recede from the equator.

Malarial diseases are usually endemic in character. At times they are epidemic, and when so prevalent, appear to stand in some hitherto inexplicable relation to epidemics of other diseases. According to Hertz the first recorded malarial epidemic prevailed in 1558, and spread over the whole of Europe. It was preceded by the influenza epidemic of 1557, and followed by the plague from 1559 to 1563. The second malarial pandemic occurred in 1678 and 1679, and was followed by the plague, which lasted for three years. The third epidemic appeared during the four years following 1718, and was succeeded by a general outbreak of typhoid fever. The fourth prevailed from 1807 to 1812. It was preceded by influenza and followed by typhoid fever. And the epidemics of 1824 and 1845 were each the forerunner of a typhoid epidemic.

Influenza and malarial diseases seldom prevail simultaneously. The same may be said, though in a less general sense, of typhoid fever and malaria. On the other hand, epidemics and endemics of remittent and typhus are frequently met with at the same time. Cholera and malaria often flourish side by side, while intermittent fever and dysentery are well-known associates. Miliary tuberculosis too, frequently exists alongside of intermittent fever in malarial districts. The presence of malaria is now generally believed to favor and predispose to phthisical de-

velopment. And it is a clinical fact that in extensive endemics of intermittent fever, other diseases are apt to present the typical features, exacerbation and remission.

Geographical Limits.—Malaria may prevail anywhere between 63° north latitude and 57° south latitude, but is more intense the nearer the approach to the equator. It is seldom generated above an elevation of 1,000 feet above sea level. To this rule, however, there are exceptions. For malaria has been found in Peru, at an altitude of 10,000 feet, and in the plateaus of the Pyrenees at 5,000 feet, as well as in lesser elevations. Italy is undoubtedly the most malarious of all European countries. The Pontine marshes are proverbial as being vast hotbeds of malaria. In Africa the most virulent forms of malarial diseases appear on the western coast and along the banks of the Niger and Senegal rivers. The delta of the Ganges is the most malarious region in all Asia. And on this continent the Gulf states, the western coast of Peru, and the interior of Brazil furnish the most malignant forms of malarial diseases.

Marshes are especially favorable to the development of malaria, and yet all marshes are not malaria producing. Such as have a clay or limestone bottom develop the poison more readily than those possessing a sandy substratum. Dried up marshes develop it more rapidly than the submerged. Heavy rains cover up the marshes, and, although they favor a luxurious vegetation, protect them from the influence of the sun's rays. After the rains have ceased and the marshes begin to dry up, the heat of the sun causes vegetable decomposition to take place, and immediately all the conditions favorable to the development of malaria are presented. Hence malarial diseases prevail more extensively during hot weather following heavy rains, than at any other time. Some marshes are always fecund with malaria. Witness the Pontine marshes which have been malarial for over 2,000 years. On the other hand there are extensive swampy regions in hot climates that are entirely free from malarial fevers. Among these may be mentioned the warm swamp regions of the Australian coast, and the shores of the lake of Tes-cudo, in Mexico. Low lands that are exposed to annual overflow, such as are found along the southern shores of the Mississippi, are as fruitful of malaria as the swampy regions. Salt water marshes are as a rule free from malaria. But a mixture

of salt and fresh water, as on the New Jersey flats, is specially favorable to its development. Malarial soils, though oftenest found in swampy regions, are frequently discovered in localities which are not, and never have been, swampy. In new and unsettled districts the upheaval of the alluvial soils favors the development of malaria.

Edwards rationally explains this by saying that "all land—all soil that has never been before worked,—is particularly rich in organic matter. The leaves from the trees have for centuries been dying, decomposing and yielding their organic constituents to this earth. The birds and wild animals which, from the beginning of time, have roamed over this virgin land, have deposited their organic excrement upon it. The winds have wafted organic material from far off cities to it; while countless myriads of animals have died and decomposed on this land, yielding up their component parts to it. The rains and snows of centuries have washed all this organic material into the earth, until this land fairly teems with organic wealth. Like the untrodden prairies of our western country it is black with organic richness. Some little of this material is utilized in giving nourishment to the grass and trees which grow on this soil. Still, but a very small proportion of this organic matter is thus consumed, and what little is used is returned a hundred-fold in the manner indicated above, until the sub-soil of this region is fairly reeking with organic elements not exposed to the sun, while that very near the surface is consumed by the grass and trees. This soil contains moisture. Man and civilization come along; the plough turns up this land; this enormous accumulation of organic matter is exposed to the sun.

"What have we? Organic matter, heat and moisture." The three conditions which we will soon find are the most favorable to the developments of malaria. At this date malarial diseases are spreading eastward and northward in the New England states. Just why this should be so we are unable to say. The state authorities are busily engaged trying to solve the problem.

The Nature of Miasm.—Up to the present time but little is known of the exact nature of malarial poison. Many theories have been advanced concerning it, since the dawning of the present century. Some of the older observers believed that it was the result of the decomposition of vegetable organisms, and

existed in a gaseous form. Others attributed it to subterranean exhalations. A few declared it to be a specific poison having no tangible chemical or microscopical constituents. Some believed it to be of a vegetable nature, while others contended with Armand, that the thermo and electro-hygrometric phenomena of the atmosphere constituted the remote causes of fever. These conjectures all remain unproven, and we are as yet in doubt concerning the nature and working of the malarial poison.

The theory that is now attracting the most attention, and which thus far appears the most rational, is that which attributes all malarial diseases to the presence and germination of a special fungus, the bacillus malarie (Fig. 4), in the blood. The recent experiments of Klebs and Tommassi-Crudeli of Rome, following those of Scoda, Balestra, Salisbury, and Hannon, have done much to turn the tide of professional opinion in favor of the parasitic theory. The former experimenters claim to have discovered to a certainty the presence of the bacillus malarie in the soil and atmosphere of malarial districts, and also in the blood of malarial fever patients. The "Medical Times and Gazette" in publishing an abstract of their report says: They first succeeded in producing the symptoms of malarial poisoning in animals by injection of watery extracts from the marshy soil. They then proceeded, by the process called "fractional cultivation," to isolate the active material, that is the true generator of the disease, supposed to be a living organism. Lastly they isolated the organisms by filtration, and comparing the results obtained in injections of the filtrate with those produced by the residue containing the organisms, they proved that the poison of malaria resides in these. The fungi obtained appeared as small rods of 0.002 to 0.007 millimeter in length, growing into long twisted threads. The fungus is markedly aerobiotic. If air is excluded, it dies out. The injection of these fungi, true bacilli malarie, into the healthy animals always gives rise to symptoms of intermittent fever, with enlargement of the spleen, etc. Later, Cuboni and Marchiafava at Rome, have been able to demonstrate spores and bacilli in the spleen, the marrow, and blood of three persons who died of pernicious fever, showing the same characters as those observed by Klebs and Crudeli. Dr. Sternberg's experiments with swamp mud taken from the suburbs of New Orleans fully corroborate those of the Italian physicians.

Important observations have still more recently been made by Laveran and Richard in France. The former noticed a peculiar, though differently formed, organism possessing very remarkable characters, invariably present in the blood of malarial fever patients; while the latter found the special habitat of the parasite to be the red corpuscles of the blood. Richard's observations on the life history of the organism are thus reported: "During the attack of fever many blood globules are seen which possess a small, perfectly round spot, but they have otherwise the normal appearance and possess the normal elasticity. In other corpuscles the evolution of the parasite is further advanced; the clear spot is enlarged and is encircled by small black granules, while around it the hæmoglobin, recognizable by its greenish-yellow tint, forms a ring which becomes narrower as the parasite increases in size. Ultimately this substance of the corpuscle is reduced to, a narrow, decolorized zone, from which the hæmoglobin has disappeared. The appearance is then that of a circular element, having nearly the dimensions of a red blood globule, and containing an elegant 'collarette' of black granulations, which is in effect the organism arrived at maturity. The parasite then pierces the membrane which contains it, and escapes into the blood plasma. In the ultimate condition of many of the infected corpuscles the pigmentary collarette is absent, and there is merely a greyish mass, containing a few black granulations, which have been noted by Kelsch, and some other observers. These pigment-granules become free, and rapidly broken up by the leucocytes, which become impregnated with them. Hence the melanotic leucocyte, which has often been observed in malaria is, so to speak, only an epi-phenomenon of the palustral process, the primordial and essential change being that in the red corpuscles." But it is impossible here to enter into a more lengthy consideration of the facts and arguments by which this parasitic view has been supported. Suffice it to say that from the evidence already at our command the bacteria theory may be considered as placed on something like a substantial basis.

The Laws of Malaria.—In all malarial localities, three important factors are invariably necessary for the multiplication of the parasite, and development of the morbid agent:

1. A certain amount of vegetable matter.

2. A certain amount of moisture.

3. A certain average degree of temperature.

The vegetable matter and the moisture must be found either on the surface, or in the substance of the soil. And the average temperature for the twenty-four hours must not fall below 58° Fahr. A prolific germination, and consequent rapid increase of malaria, will not take place unless the average daily temperature ranges as high as 68° Fahr.

Malaria may find entrance into the human organism in either of two ways:

1. By the respired air.

2. By the intestinal tract, with food or water.

Once introduced into the body, it has the power to reproduce itself. The length of time that elapses between the introduction of the morbid agent and the outbreak of the malarial attack varies from six to twenty days. This period is called the stage of incubation, and has an average length of fourteen days.

No race or nationality enjoys immunity from malaria. But according to statistics, the blacks are less susceptible than the whites. All periods of life from infancy to old age are liable to its attacks. In children under five years it commonly assumes the form of intermittent bowel troubles. In youth, intermittent and remittent fevers are the most prevalent. In adult life, malaria may appear in all its forms. And in old age, the attacks though less common, are apt to take on the pernicious type. Women are more susceptible than men. The masked forms of intermittents occur more among the former, while the severer forms of malarial diseases are oftener met with among the latter. Women are oftenest attacked at the time of menstruation, but are said to enjoy immunity during the last months of pregnancy. Idiosyncrasies of constitution render some less liable than others to its influence. The weak and the anæmic are easy victims; and an organism once invaded is thereby rendered more liable to subsequent attacks. It is very doubtful whether an organism which has once been thoroughly charged with malaria, can ever become entirely free from its influence. A certain degree of tolerance of malaria—called by some acclimation—may come from long residence in a malarial district. This tolerance must not however be construed an exemption from its influence. And although it is the new comers to a ma-

larial district who suffer the most from the acute manifestations, yet the older residents are apt to enjoy less robust health in consequence of some chronic malarial affection. Should one of the latter, old and apparently acclimated settlers, be taken sick with any active form of disease—pneumonia for example—he would be almost sure to succumb, owing to the surcharge of the system with malarial poison, when under other circumstances he would in all probability have recovered.

Malaria is peculiarly endemic, and seldom wanders far from its native soil. It may however be carried down rivers from malaria-generating to non-generating regions; and it may also be carried by the wind from malaria producing to non-malarial districts. From four to five miles is the greatest distance it has been known to be transmitted by the wind. It may be carried by the latter up along the sides of mountains to an elevation of from 500 to 1,000 feet.

Conditions Favorable to the Development of Malaria.—The three conditions necessary to the development of miasm are:

1. A luxuriant vegetation, with partial decomposition.
2. A temperature above 58° Fahr. The higher the temperature, the more virulent the miasm.
3. Moisture and atmospheric air.

As aiding or supplying these conditions, we will mention the following:

1. Marshes, swamp lands and damp bottom lands. These are especially active after heavy rains, when they are drying up, or are simply covered with a thin sheet of water.

2. A mixture of salt and fresh water marshes furnishes the most favorable conditions for the development of malaria.

3. Railroad excavations, and the cultivation of new lands, favor the generation of miasm by bringing decomposed vegetable matters to the surface, and by exposing the new soil to the heat of the sun and moisture.

The excavations necessary for the laying of the cable track of the south side street railway, and for the putting down of sewers in this city, are at the present time causing the generation of malaria, as evidenced by the increase of malarial diseases along the lines of excavation.

4. Hertz speaks of the favorable conditions for the develop-

ment of malaria presented by an elevated and apparently dry region, with a stratum of loose surface soil and a deeper floor of clay or some other impermeable soil beneath, where a large amount of surface water loaded with vegetable ingredients percolates through the loose upper earth and is retained in the lower stratum. The intense heat of the sun often causes cracks and deep rifts in the earth, and by exposing the vegetable matters to decomposition favors the germination of the miasm.

5. The wind exerts considerable influence in developing as well as in conveying malaria. This may depend somewhat upon various thermo-atmospheric conditions.

6. All weakening influences such as increased moisture of the atmosphere, exposure to excessive solar heat, sudden cooling of the cutaneous surface, and inordinate eating or drinking, favor the action of malaria. These, each and all, act by disturbing the equilibrium of the body, and thus diminishing the power of resistance.

Conditions Inimical to the Production of Malaria.—Passing from this enumeration of the favorable conditions, we will now briefly consider the unfavorable ones:

1. We may mention the extremes of latitude. Malaria is seldom generated north of 63° north latitude, or south of 57° south latitude. The farther we recede from the equator, within these limits, the more feeble becomes the malarial poison.

2. Malaria is seldom generated beyond 1,000 feet above the level of the sea.

3. Thorough ditching and draining, with steady cultivation of the soil, prevents any prolonged generation of malaria in the majority of marshes.

4. An average temperature below 60° Fahr., is always unfavorable to the generation of the malarial poison. This is a general rule, and holds good everywhere.

5. The daytime is less favorable for the development and germination of the miasm than is the night.

6. Strong winds diminish the virulence of the poison. On the other hand a hot and dry atmosphere with little or no wind, especially after heavy rains, increases it.

7. Certain plants are found to lessen the quantity of malaria. The common sunflower (*Helianthus Annuus*), possesses considerable absorbing power, and has been used with great success in

the Eastern states. The Calamus (*acorus calamus aromaticus*) has been used, and is recommended by Sebastian. And the Eucalyptus has been planted with some success throughout the marshes of Italy.

8. At times, all the conditions exist that are necessary to generate miasm, and yet no poison can be found. This peculiar phenomenon is believed to be caused by the presence of ozone, which is largely developed in some marshes, and exerts, as you know, a paralyzing influence over bacterial life. Examples of this may be found among the islands of the Pacific, and in the swamp lands of Australia.

Climatic Influences in the Genesis of Malaria.—The seasons of the year have considerable influence over the development of malaria. In tropical regions malarial fevers almost always arise during the summer. They begin about the latter part of June or the first of August, and they reach their acme sometime between July and October. In colder climates they appear in the spring, decline in the summer, and re-appear in a more serious form in the fall. In temperate climates the winters are usually free from malarial diseases. In the tropics the more damp the year the more severe the fevers. A wet spring and a hot summer followed by a hot autumn, as well as a wet spring and hot summer followed by a wet autumn, give a decided impetus to the development of malaria. During the summer there is a tendency to implication of the nervous system and digestive apparatus, while during the winter the disposition is to catarrhal and inflammatory affections of the respiratory organs. The quotidian type of intermittents occurs oftenest during the warm summer months. The tertian appears mostly in autumn and early spring. Remittents tend to follow the quotidians, and quartans are apt to follow tertians in the autumn.

Critical Days.—Favorable cases of fever show a decided tendency to terminate upon what are called critical days. The critical days are the 3d, 5th, 7th, 9th, 11th, 14th, 17th, 21st, 27th and 31st. The non-critical are the intermediate days; but the 4th and 6th are considered secondarily critical. A seven days' case of fever usually terminates on the 3d, 5th or 9th day, and a fourteen days' case on the 3d, 5th, 7th or 9th. Cases that pass the 7th day are apt to go on to the 11th. The fourth day of the week is always the indicative day. Hippocrates says that sweats

occurring on critical days are salutary, and denote a favorable turn in the disease, while those which occur on the other days denote exhaustion, obstinacy and relapse of the disease. My friend Dr. Raue, following Grauvogl, thus explains the doctrine of critical days:

According to physiological experiments it appears that a living organism, when it is subjected to a starving process, does not lose its bodily substance evenly, but rather periodically, so that its greatest losses always fall upon the fifth, eighth and thirteenth days. Thus the operations in a living organism differ essentially from mere mechanical or chemical operations. If you, for example, expose a vessel with water to an equally dry atmosphere, it will lose its contents by evaporation evenly, just so much an hour. The living organism does not. It regulates its expenditures or its losses according to its own laws, which allow its receipts and expenditures to oscillate between a certain boundary, and make its operations to go on in regular periods.

These periodical fluctuations are therefore the law of normal life, part and portion of all its evolutions in health and disease, and are not peculiar to states of disease. When, therefore, in diseases on the third, fifth, seventh, thirteenth, twenty-first and thirty-fifth day, a greater amount of losses sets in, in the form of excretions, such as sweat, flow of urine, diarrhea, etc., which is called the crisis, it is nothing more or less than the same periodic oscillation which is going on continually in the living organism, and which becomes more conspicuous only in disease, because it is frequently followed by a decided improvement or death. It necessarily must become more conspicuous, because this periodical loss is added to the extra consumption, which is a condition of the acute disease. If the physical state of the patient be such as to endure both, he, of course, must feel better the next day, when the periodical acme ceases; and he dies, if his physical power cannot endure the united action of both. Thus the critical days of the disease are nothing more nor less than the normal, periodical fluctuations of the living organism, with which they correspond; and the crisis is that critical day with its normally increased excretions, which falls together with the height of the disease.

These observations are corroborated by the following facts: that the so-called crisis does not appear, when during the course

of a disease the organism is weakened by improper medication, because then the natural periodic fluctuation is disturbed and destroyed; and it does not appear when, by the application of the proper remedy, health is restored; because the periodic fluctuation alone is not conspicuous enough to be observed. It is, however, never wanting when the disease runs an undisturbed course; and in so far it is an important means to distinguish between a successful and an unsuccessful treatment.

Raue further says, that:

1. The right remedy cures a disease without a crisis; and thus we have an indisputable proof that the selected remedy *was the* remedy.

2. Aggravations after a remedy, when they occur on critical days, need not be the result of the remedy, as the conjoined action of the disease and the periodical oscillation alone, will cause them naturally.

3. When after the administration of a homœopathic remedy a crisis takes place notwithstanding, we may be sure we did not "hit" the case, and that the patient got well without our aid.

4. When no crisis appears, and the patient gets worse and worse, it is clear that we did not find the right remedy, and we may even have spoiled the case by wrong means.

Thermometry of Fevers.—A few words on the temperature range in fevers and I have done. You all well know that the normal temperature in the axilla is stereotyped at 98.6° Fahr., and that it is about a degree higher in tropical than in temperate climates. In temperate regions it is highest in the early morning and lowest at midnight, while in the tropics it is lowest in the early morning and highest during the day. In children it may be normally one or two degrees higher than in adults. A temperature rise of 1° Fahr. corresponds, as a rule, with an increase of from 8 to 10 beats per minute, of the pulse. In severe diseases the temperature may fluctuate between 95° Fahr. and 109° Fahr. The highest temperatures are found in scarlet fever and yellow fever. Wunderlich, who has made a special study of clinical thermometry, gives us the following characteristics: Temperatures much below 96.8° Fahr. are collapse temperatures; below 92.13° Fahr., deep, fatal algid collapse; 92.3° to 95° Fahr., algid collapse, with great danger, still with possibility of recovery; 95° to 96.8° Fahr., moderate collapse, in itself

without danger; 99.5° to 100.4° Fahr., sub-febrile temperature; 100.4° to 101.12° Fahr. slight febrile action; 101.3° to 102.2° Fahr. in the morning, rising to 103.1° Fahr. in the evening, moderate fever; 103.1° Fahr. in the morning and about 104° Fahr. in the evening, considerable fever; 103.1° Fahr. in the morning and above 104.9° Fahr. in the evening, high fever; 107.6° Fahr. and above indicates usually a fatal termination, except in relapsing fever. Temperatures have occasionally been reported as high as 112° , 113° , 115° and even 117° Fahr., where patients have recovered.

A fever temperature of 104° to 105° Fahr. indicates that the progress of a disease remains unchecked.

A rise in temperature or a stable high temperature from evening until morning is generally a sign that the patient is getting, or will get, worse. But stability of temperature from morning to evening is generally a favorable indication. All temperatures should invariably be taken morning and evening, and still more frequently in critical cases. The axilla is generally considered as the best place to take the temperature, though in children the rectum is probably better. And from three to five minutes is the average interval between the insertion and removal of the clinical thermometer.

LECTURE III.

Simple Intermittent Fever.

At my last lecture I spoke of the nature and origin of malarial poison. To-day I wish to direct your attention to the fevers caused by this poison. The first in the list, according to our classification, is Simple Intermittent Fever.

Definition.—Simple intermittent fever may be defined as a paroxysmal disease, due to the action of malarial poison, and characterized by the occurrence of febrile paroxysms (consisting usually of a succession of definite stages, viz. the cold, the hot and the sweating stage), separated by intermissions or apyrexial periods of variable length. According to the length of the interval, the fever may be of different types, viz. quotidian, tertian or quartan.

Synonyms.—It is popularly known as ague, fever and ague, chills and fever, the shakes, swamp fever, etc.

History.—The history of intermittent fever dates from early times. Celsus clearly defined the quotidian, tertian and quartan forms. Archigenes first recognized the masked intermittents, and Diomedes Cornarus was the first writer who described an intermittent type of dysentery. Later Rhazes described those long-lasting types of intermittents, having no apyrexial period, where the chill stage of a second paroxysm occurs during the sweat stage of the first, and which constitute a transition stage to the remittent. Intermittent fever is recorded as having been quite fatal in Europe during the seventeenth century. In the early part of the present century it prevailed very extensively throughout this country, and was alarmingly fatal.

Etiology.—Intermittent fever is universally conceded to be due to malarial poisoning. The nature of the poison has been already considered in a previous lecture. We will therefore pass by the question of causation, simply reminding you of the fact, that the preponderance of testimony from recent investigations tends to strengthen the theory of the parasitic origin of the intermittents, and points to the bacillus malarie as the cause.

Clinical History.—The clinical history embraces a description of the prodromal stage, the three paroxysmal stages, the intermission, the types, and the sequelæ. The *prodromal* stage, or the stage of incubation, is of variable length, averaging from six to eight days. This stage is not always present, for frequently, suddenly and without warning, the paroxysmal stage is ushered in. The symptoms are uniformly not very definite. The patient feels tired, and complains of frontal headache, pains in the loins and legs, with yawning, stretching, and general malaise; the functions of the stomach are somewhat impaired, and there is thirst and anorexia. The taste is metallic, the breath foul, and the tongue furred, yellow in the center and white at the edges; the skin is hot, dry, and perhaps slightly icteric; the pulse is small and frequent; the urine is scanty, high-colored, and deposits a red sediment; the fecal discharges are dark-colored and offensive; these symptoms continue with more or less prominence from one to ten days, and eventually terminate in a rigor, which is the commencement of that series of phenomena which characterize the paroxysmal stage.

Paroxysms.—A paroxysm of intermittent fever consists of three well-marked stages, viz: the cold, the hot and the sweating stage.

Cold Stage or Chill.—This stage is usually ushered in by a sensation of chilliness or coldness beginning in the back, loins or extremities, and gradually creeping over the entire body. The skin becomes pale and shrunken, and presents the appearance of goose-flesh (*cutis anserina*.) The face becomes pale, the eyes are sunken, the nose is pointed, and the lips and finger-ends become blue; the sensation of chilliness increases, the teeth begin to chatter, the limbs commence to shake, and the whole frame participates in the general commotion; the voice

becomes weak, husky, and tremulous; the respiration becomes hurried, and is attended by a sense of weight and tightness in the chest, and not unfrequently by a short, dry cough; the pulse is small, quick, and firm; the mind is usually clear, but peculiarly irritable; occasionally there is delirium; in young children, convulsions are apt to occur; the temperature of the surface of the body is below the natural standard, while in the mouth, axilla or rectum the thermometer may register 104° Fahr., or 105° Fahr; the mouth is dry, but the tongue continues moist; thirst is usually urgent, and nausea is often a prominent symptom; the urine is increased in quantity, clear, colorless, of low specific gravity, and does not deposit a sediment on cooling; the dejections are apt to be dark and bilious; this stage lasts from a quarter of an hour to three hours. Its departure, which is sometimes abrupt but generally gradual, is announced by the abatement of the chills, and by the appearance of transient flashes of heat, starting from the extremities.

Hot Stage.—This stage is one of reaction. The countenance is no longer pale and shrunken, but on the contrary it is flushed and turgid; the heat of the surface now becomes marked; the temperature rises to 105° Fahr., and at times approaches 110° Fahr., or even higher; the pulse is full, strong and rapid; the respirations are hurried, but not oppressed; the headache increases and the patient becomes extremely restless; the mouth is dry and hot, the tongue parched, and herpetic vesicles occasionally appear on the lips; thirst is a prominent and distressing symptom; the urine is now scanty, high colored, and of high specific gravity; this stage may last from an hour or two to twelve or sixteen hours. The average duration is from three to four hours.

Sweating Stage.—This stage comes on gradually. It commences in a perspiration which appears first on the forehead and face, and afterward on the trunk and extremities; the pulse now loses its frequency; the breathing becomes natural; the urine passes freely, but retains its high color, and deposits a light red, lateritious sediment; the headache and thirst abate; the fever disappears. The patient falls off into a quiet sleep, and the state of apyrexia is established; the average duration of this stage is from three to four hours.

Such is the normal course of an intermittent paroxysm. Devi-

ations may however occur, and certain stages may at times be wanting.

Dumb ague is the popular name for an attack from which the chill is absent, the fever and sweat alone recurring periodically. When an intermittent paroxysm occurs one day, and an intense neuralgia, urticaria, dyspepsia or dysentery takes its place the following day, we have what is termed a masked intermittent.

Intermittent neuralgia—very common in malarial districts—may attack either the intercostal, the sciatic, or the frontal branch of the ophthalmic division of the fifth nerve. When it attacks the latter nerve it is called “brow ague.” In malarial districts all complaints are apt to take on periodicity.

Intermission.—During the intermission the patient may at first feel ordinarily well. But after repeated paroxysms, he is apt to become debilitated and anæmic, and sooner or later presents all the symptoms of malarial cachexia.

Laws of the Paroxysm.—The following laws have been tabulated as governing to a certain extent the paroxysm:

1. The shorter the intermission the longer the paroxysm.
2. The longer the paroxysm the earlier it commences in the day.
3. The more durable the cold stage, the less durable the other stages.

Types.—Intermittent fever is divided into types corresponding to the length of the interval. The *interval* is the period from the beginning of one to the beginning of the next paroxysm, and differs from the *intermission* in that the latter is the space between the ending of one paroxysm and the beginning of the succeeding one. Each type, viz: the *quotidian*, the *tertian* and the *quartan*, observes a law of periodicity in the succession of paroxysms. In the *quotidian* type the paroxysm recurs every day. In the *tertian* it recurs every other day. And in the *quartan* it recurs on the first and fourth days. The *quotidian* and *tertian* forms are the most frequent; while the *quartan* variety is comparatively rare. The *tertian* type occurs most frequently in temperate climates, but in tropical regions the *quotidian* prevails.

In this country these two types vary in frequency during dif-

ferent seasons. Usually the tertian is supposed to be the most prevalent. But in the aggregate, according to Woodward, the quotidian appears to predominate. For out of 98,237 cases occurring in the United States army, 51,623 were cases of quotidian fever, and only 44,857 cases were of the tertian variety. The quartan type occurs chiefly in autumn, but even then is rarely met with, except during prolonged malarial attacks. The quotidian and tertian types prove more obstinate in autumn than at any other season of the year. The latter variety occurs more frequently in adults than in children, and attacks the sanguineous temperament oftener than the leucophlegmatic. In the quotidian type the paroxysm usually recurs in the morning (daily), and lasts from 8 to 10 hours. In the tertian it recurs about noon (of the third day), and lasts from 6 to 8 hours. While in the quartan it recurs in the afternoon or evening (of the fourth day), and lasts from 4 to 6 hours.

Other types are mentioned by various writers, such as the *quintan*, in which the paroxysm recurs on the fifth day; the *sextan* on the sixth; the *septan* on the seventh; the *octan* on the eighth, and so on. Such cases are however great rarities, and are looked upon as simply curiosities of clinical experience. In addition to these simple types we have mentioned, irregular compound forms are occasionally encountered. Thus a *double quotidian* may be presented with two paroxysms daily: one severe in the morning, and the other mild in the afternoon or evening. Or a *double tertian* with a paroxysm daily; the paroxysms differing on successive days, but corresponding in every respect on alternate days. Or finally a *double quartan* may appear in which a paroxysm recurs on two successive days, but is absent on the third day. The *double tertian* is the most frequent of the compound types.

As regards the regularity of its appearance, a paroxysm may be either anticipating or postponing. When it recurs a little earlier each day it is called an anticipating paroxysm. And it is called a postponing paroxysm when it recurs a little later each time. An anticipating paroxysm shows that the disease is progressing, and is not being controlled by remedies, while a postponing paroxysm indicates that the disease is not only being controlled, but is about to end. When a relapse occurs it is usually at the end of seven, fourteen, twenty-one or twenty-

eight days from the last paroxysm. Patients cannot be considered beyond the danger of a relapse until six or eight weeks have elapsed without an attack.

CHART II.—Simple Intermittent Fever.

Types:	Quotidian: Tertian: Quartan: Double Tertian.				
Periods:	Incubation,	Paroxysmal Period.			Intermission.
		Cold stage,	Hot stage,	Sweating stage.	
Duration:	6 to 8 days,	$\frac{1}{4}$ hr. to 3 hrs.	3 to 4 hours,	Uncertain, average, 3 to 4 hours.	6 hours to 3 days.
Initial Symptoms	General malaise,	Creeping chills, starting in back,	Hot flashes from extremities,	Perspiration on forehead,	SUBSIDENCE OF ALL SYMPTOMS.—Marked prostration may remain.
Temperature:	May or may not be slightly above the normal.	100° F. to 105° F.	105° F. to 110° F.	Rapidly approaches the normal,	
Pulse:	Small and frequent, 80 to 100 per minute.	Small, quick and hard, 90 to 120 per minute.	Full, strong and rapid, 110 to 140 per minute.	Nearly normal but weak, 70 to 85 per minute.	
Respiration:	Normal,	Hurried and oppressed,	Hurried but not oppressed,	Normal,	
Skin:	Dry,	Cold. Face pale and shrunk,	Hot. Face flushed,	Moist.	
Urine:	Scanty and high colored,	Profuse and colorless, low sp. gr.	Scanty, high colored, high sp. gr., dep. of urates,	Copious but high colored,	
Tongue:	Furred, yellow in center and white at edges, metallic taste,	Moist and furred. Thirst,	Parched with thirst,	Moist.	
Intestinal Canal:	Anorexia. Dark fecal discharges,	Nausea and vomiting. Bilious defections.			
Nervous system:	Frontal headache,	Headache, mind clear, but irritable,	Increased headache, extreme restlessness,		
Duration:	Duration of the disease is indefinite.				
Sequels:	Anemia, Enlargement of Spleen ("ague-cake"), Anasarca and dropsy.				
Etiology:	Malarial poisoning.		Bacillus Malariae.		

ANALYSIS OF CHART.

The Nervous System.—A chill more or less severe usually marks the onset of the attack; headache is very common and

occurs as an early symptom, it is usually frontal, but occasionally it becomes general; delirium is rare, and when it exists is but transitory; restlessness is frequently quite marked during the paroxysmal stage. Hyperæsthesia of the cutaneous surface in the region of the first dorsal vertebra, is frequently associated with pain in the back of the neck.

The Temperature.—The temperature rises with great rapidity. During the initial chill it is often as high as 104° Fahr., and may reach 105° Fahr. or even 110° Fahr. in the hot stage. The defervescence is frequently as sudden and marked as the temperature rise. During the intermission the temperature is normal.

The Circulation.—The pulse is variable. It is increased in frequency especially during the paroxysmal stage. At the period of highest temperature it is apt to be full and bounding.

The Digestive System.—Nausea and vomiting sometimes accompany the initial chill. There is usually loss of appetite, thirst, impaired taste and a coated tongue; the evacuations are commonly offensive and of a dark color.

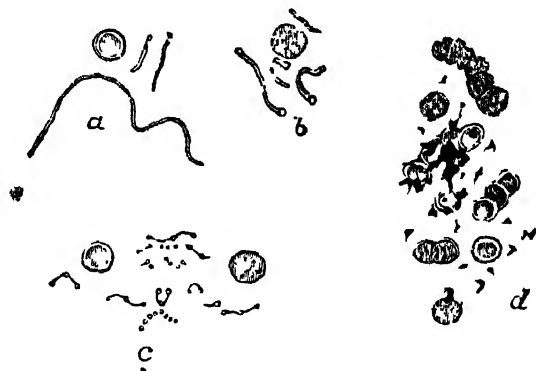
The Secretions.—The urine is diminished in quantity during the incubative period and in the hot stage. Its color is darker than natural, except during the cold stage. The specific gravity is above normal in the hot stage, but below it in the stage of chill. The amount of urea excreted increases rapidly, reaching its maximum at the beginning of the hot stage. The cutaneous surface is moist and cold during the chilly stage, but dry and hot during the hot stage. The perspiration during the sweat stage may be either copious or slight, and has a “fresh-baked brown bread” odor. A sallow or icteric hue generally attains in long lasting cases. Herpes labialis frequently appears.

Sequels.—Anæmia is very apt to occur in cases of long duration. And in protracted intermittents, as in those which have been marked by repeated relapses, a chronic malarial cachexia frequently obtains, characterized by sallow skin, anasarca and generally dropsy. While in still more severe cases, amyloid degeneration of the kidneys, liver or spleen may supervene.

Morbid Anatomy.—Anatomically, simple intermittent fever presents no characteristic lesions other than those of hyperæmia.

The blood, which is the vehicle of the poison, undergoes certain changes. A diminution in the number of red corpuscles and a decrease in the amount of fibrin invariably take place. The

FIG. 9.



Microscopical appearance of the blood in Malarial fevers. *a. b.* Bacillary filaments. *c.* Spore-products seen during cold stage of intermittent fever. *d.* Pigment granules.—N. B.—The red blood-discs furnish a scale for measurement.

presence of black pigment granules (Fig. 9) has been fully demonstrated by Kelsch, Richard and others. And the bacillus malarie has been observed in the blood, liver and spleen, by Cuboni and Marchiafava. These changes in the composition of the blood are, however, not so well marked in intermittent, as in remittent and pernicious malarial fever. The spleen and liver are apt to become more or less enlarged from hyperæmia. The former organ especially, may become enormously enlarged, and distending the abdominal walls constitute what is vulgarly styled "ague-cake."

Differential Diagnosis.—The differential diagnosis of simple intermittent fever is by no means difficult. A well marked case can hardly be mistaken for anything else. Latent and masked intermittents are perhaps more difficult of recognition. The only diseases with which it may be confounded are remittent fever, pyæmia and the hectic of tuberculosis. From remittent fever it may be readily distinguished by the fact that in remittent fever there is no intermission. This stage is always present in intermittent fever. The temperature during the remission in remittent fever is one or two degrees higher than normal; while in intermittent fever the temperature falls to the natural

standard during the intermission. Remittent fever usually has but one chill, while in intermittent fever a chill inaugurates each paroxysm. From pyæmia it may be distinguished almost as readily as from the remittents. The accession of the fever in pyæmia observes no regularity, and there is no complete intermission. Whereas, in intermittent fever the febrile paroxysm comes on at regular intervals, and there is always a complete intermission. In pyæmia the chill is short, the fever runs high, and the sweating stage is generally prolonged. The temperature in pyæmia never approaches the normal, while in intermittent fever there is a period of complete defervescence. Febrile paroxysms resembling those of intermittent fever are occasionally noticed in connection with tubercular phthisis. In the hectic of tuberculosis the paroxysms occur oftener in the afternoon than in the forenoon, and the intermissions are incomplete. Whereas, the reverse obtains in true intermittent fever. The principal element in the diagnosis, however, is obtained by physical exploration. For in tuberculous disease the characteristic physical signs are seldom wanting. Finally, it should be remembered that paroxysms resembling those of intermittent fever are frequently produced by catheterism and other operations on the urinary passages.

Prognosis.—The prognosis in simple intermittent fever is as a rule, favorable. The tertians are the most easy of cure, while the quartans are the most obstinate; the quotidians are the most serious in their results. The prognosis in masked intermittents is generally favorable. An anticipating paroxysm is an unfavorable sign, while a postponing paroxysm is usually favorable. The presence of anæmia or dropsy vitiates the prognosis, as it indicates the development of malarial cachexia. Relapses are common.

LECTURE IV.

Simple Intermittent Fever.—(CONTINUED.)

TREATMENT.

I will invite your attention to-day to the treatment of Simple Intermittent Fever. Many are the books that have been written on this subject and innumerable the writers who have tried to definitely outline its course. And yet our therapeutics can scarcely be declared the richer from these efforts. For, notwithstanding all that has been written, we have nothing better to offer you this morning than the advice given by Hahnemann long years ago, viz.: Let the totality of the symptoms be your chief guide in the selection of your remedy. To individualize each case closely is your only choice. As you watch the sequence of symptoms in your search for a remedy, two similars will generally appear before you. The one general in character, and corresponding with the symptoms which are diagnostic of the disease; and the other special, and corresponding with peculiar symptoms which characterize each individual case. The latter is of more importance than the former in making the selection. Other things being equal the symptoms of the paroxysm are not of as much importance as those of the intermission. Look then to the intermission for the leading indications. Watch the concomitants of the case. And finally rely, whenever you can make the selection, on the single remedy which covers the symptoms of both the paroxysm and the intermission, and is the special in the case.

The best time to administer the remedy is during the intermission. In severe cases it may be continued into and through

the paroxysm. Beware of too frequent changes of the remedy. For as long as the paroxysms continue to decline in duration and intensity, the patient is doing well and there is no necessity for a change.

Touching the question of potency, let me advise you to be neither high nor low, exclusively. For the high attenuationist, on the one hand, is apt to lose sight of his patient, and the causation of the disease, in his desire for altitude; while the low attenuationist, on the other, who lives only in the lower stratum of the law of similars, fails to reap all the benefits capable of being derived from a more generous comprehension of its truths. The practice which has been the most successful in the treatment of intermittents is to use the lower attenuations in recent cases, and the higher attenuations in the chronic forms.

Laws of Selection, etc.—As tending to further guide you in the selection and administration of the remedy, we will formulate the following laws:

1. Individualize each case.
2. Follow the totality of symptoms.
3. Grade the symptoms. Give special prominence to those peculiar to the patient; select as next in importance those appearing during the intermission; and supplement both with the symptoms of the paroxysm.
4. Never change a remedy when the paroxysms are lessening in duration and intensity.
5. In acute cases use the low attenuations; in chronic cases use higher attenuations.

Prophylaxis.—Residents in malarial districts, should, as far as possible, avoid over-fatigue, exposure to sudden changes of temperature, dietetic errors, and excesses of all kinds. The sleeping apartments should be in the upper part of the house, so as to be above the stratum of malaria which is denser the nearer the approach to the earth's surface. Susceptible individuals should remain in-doors at night. When late evening and early morning exposures cannot be avoided, a respirator should be worn. At all times respiration should take place through the nostrils, and the mouth kept closed. The food should be nourishing and taken with regularity. All contaminated waters

should be boiled and filtered before used. And breakfast should always be taken before going out in the morning air. Flannel or silk should be worn next the skin. When malarial fevers are prevailing *quinine 3x*, *gelsemium 3x*, or *alstonia constricta 1x*, may be given morning and evening as a preventive.

Principal Remedies.—Quinine.—Our sheet anchor in the treatment of simple intermittent fever is *quinine*, for no other remedy is so frequently the similimum for a case of ague. And so generally is it indicated, that there is room for doubt whether in intensely malarial districts intermittent fever can be arrested without its use. An additional reason for its frequent use exists in the fact that it has the power to destroy the bacillus malarie in the blood.

Truly it is a most potent aid in malarial diseases. And as the Master laid the foundations of homoeopathy in cinchona bark, we can ill afford to esteem it slightly. Our brethren of the old school have woefully abused it with their massive doses. For when quinine is adapted to a case it will cure it in small doses, and will cure it quickly. Large doses of the drug are apt to produce toxical effects and generally the patient is made worse instead of better. The severest type of malarial cachexia is often induced by over-dosing with quinine. Quinine is especially adapted to acute intermittents of the tertian type. The more perfect the intermission, the stronger is the indication. In chronic intermittents and in malarial cachexia it will seldom prove a remedy.

The proper time to administer quinine is during the intermission. You may give it in varied strength, from the second trituration to two-grain doses of the drug. And in occasionally severe forms of simple intermittent fever, such as may occur in intensely malarial regions, the hypodermatic injection of the bisulphate of quinine as recommended in pernicious malarial fever, may render excellent service. It will sometimes happen to you in practice, that the picture of a case cannot be made to correspond closely with the picture of the nearest remedy, and that consequently the correct similimum cannot be reached. In such cases quinine may be given from one to three hours before the paroxysm, and the most nearly similar remedy during the fore part of the intermission. For time-honored experience has demonstrated, that when so administered, it curtails the parox-

ysms, hastens the cure, and does not in any way interfere with the action of the chosen remedy.

Arsenicum alb. ranks next to quinine. It differs markedly from the latter in this, that the more widely the paroxysms vary from the typical form, the better it is indicated. Some of the stages of the paroxysm may be wanting. The fever stage may recur alone. There may be no preceding chill, nor following sweat, and the intermission may be oftentimes but poorly marked. Unusual functional derangement of the abdominal organs frequently appears in the arsenic cases. The prostration is generally greatest after the hot stage. Arsenic is apt to be needed in imported, slow developing intermittents, and especially when there is a dropsical tendency. It is an important remedy in "brow-ague," and in the afternoon intermittents of nursing children. And it is often required where quinine has been used to excess. It vies with *natrum muriaticum* and *ferrum*, in chronic malarial cachexia.

The **Arsenate of Quinia** has been used with success in masked intermittents, and in mixed types of simple intermittent.

Ipecac is frequently called for in mild intermittents of the tertian type. It resembles arsenic in many particulars. But its prostration is always greatest during the chill, while that of arsenic reaches its maximum after the heat. The gastric symptoms are apt to predominate during both the paroxysm, and intermission. The intermission is seldom very complete. Ipecac will prove useful in cases that have been drugged with quinine or arsenic. It should always be thought of and compared with *pulsatilla* when relapses are brought on by errors in diet. And in obscure cases it will frequently be a valuable remedy.

Gelsemium follows ipecac well, and is oftenest indicated in the quotidian type of simple intermittent. It vies with arsenic in imported and slowly developing cases, and with *eupatorium* in such as have a tendency to run into remittents. The intermission is apt to be short, and the paroxysms recur with marked regularity. Gelsemium is a valuable remedy in children's intermittents, and when relapses occur from sudden emotions.

Natrum muriaticum is our best remedy in chronic and badly treated cases. It is also adapted to recent cases, and especially

such as appear in newly-settled districts. The paroxysms recur daily. *Natrum mur.* is a common and efficient remedy for chronic malarial cachexia.

Nux vomica is one of the more important remedies for both the quotidian and tertian types. Its paroxysms are usually irregular and show a decided tendency to anticipate. The gastric and bilious symptoms are generally prominent, and bronchial complications may co-exist.

Pulsatilla is useful in cases of a changeable character, and when the paroxysms take on a mild form and appear mostly in the evening. It is adapted to chlorotic states, and is indicated in pregnant women, when there is a tendency to abortion. Relapses from improper diet are frequently cured by this remedy.

Ignatia is useful in mild cases occurring in nervous individuals. The intermission is usually complete. *Ignatia* frequently changes the type and almost always postpones. It is the remedy for tertians that change to quartans.

Eupatorium perf. is indicated in those severe types of intermittent that approach the remittent, and are marked by a very imperfect intermission. "Aching of the bones" is its great characteristic. "Boneset tea" is a well-known popular cure in malarious districts, for "fever and ague." For the double tertian type of intermittent it is a most valuable remedy.

Capsicum will occasionally be of service in simple intermittents occurring during the summer months.

Cedron and *Aranea* are adapted to intermittents of new districts in warmer climates, when the paroxysms recur with clock-like regularity. And *Polyporus officinalis* and *p. pinicola* are recommended by our western physicians as remedies for the quotidian type of simple intermittent fever.

Leading Indications.—The leading indications for these, our remedies for simple intermittent fever, as well as for others that are occasionally of service, may for convenience of study be arranged according to the following compilation:

Aconite.—In recent cases occurring in dark-complexioned, plethoric young persons, and in relapses from exposure to changes of temperature; great thirst for small quantities of cold

water prevails during the paroxysm (*ars.* and *nat. mur.*, opp. *bry.*); the pulse is thready during the chill, but full, hard and frequent during the fever; the chill passes from the feet to the chest and head, and coldness is caused by the slightest movement (*nux*). The fever runs high and is apt to be prolonged; it is frequently attended with cough; there is great restlessness, anxiety and nervous excitability; the sweat is frequently profuse and brings relief (*nat. mur.*, opp. *merc.*).

Ammonium mur.—Is adapted to fat, lazy people. Chilliness recurs as often as the patient awakes. During the heat there is redness of the face, and stinging sensation in the skin (*apis*, *nit. acid*); flushes of heat with profuse sweat on the extremities.

Anacardium.—In nervous, hysterical females, and in nursing children; mild intermittents in hypochondriacs; patient is very irritable and passionate (*bry.*, *cham.*); shivering, as from cold water down the back; the fever returns every afternoon at four o'clock (*lycop.*); sweat principally on the chest and abdomen; dull pressure as from a plug in different parts is very characteristic.

Alstonia.—After abuse of quinine; great debility and extreme prostration; rigors, cold sweats and diarrhea; useful in masked intermittents with dysentery.

Antimonium crud.—Especially suitable for aged persons and young people who grow fat; predominance of gastric symptoms (*ipéc.*, *puls.*, *nux*); thick, milky white coating on the tongue (*bry.*, *merc.*, *nux*); great sadness, and a woeful mood; aversion to food; strong desire for acids, particularly pickles (*ars.*); alternate constipation and diarrhea; absence of thirst (*puls.*, *quinine*); great desire to sleep (*apis*); the chill appears about mid-day; chilliness predominates (*menyanthes*); vomiting during the heat (*nat. mur.*); pulse irregular and rapid; sweat comes immediately after the chill with the heat, but soon disappears, ~~day~~ heat continuing.

Apis mel.—Is often useful in quotidian fevers, and in protracted and badly treated cases; the sweat stage may be absent; there is great desire to sleep; awkwardness; soreness of limbs and joints; great sensitiveness to touch and pressure; soreness in the region of the spleen; general oedema; urine scanty and

high-colored; white tongue, with diarrhea (*ant. crud.*); chilliness from motion or uncovering (*nux*); chill about 3 P. M.; worse in a warm room or near a stove; it begins in front of chest, abdomen and knees; urticaria as the chill passes off; urticaria, with intolerable itching, at night (*arn., led.*); thirst with the chill (*ign., caps.*); no thirst with the heat (*puls.*); desire for milk; during the paroxysm oppression of the chest with a sensation of smothering. *Natrum mur.* follows *apis* well, but *rhus tox.* does not.

Aranea.—Long-lasting chill without thirst; heat and sweat often absent; paroxysms at the same hour every day or every other day (*cedron*); chilly feeling, worse on rainy, cold days (*rhus*); headache, better in the open air; nocturnal toothache; tongue slightly coated, with bitter taste; nausea and anorexia; weight in epigastrium as from a stone (*bry., ars., puls.*); enlarged spleen; menses too early and too profuse; heaviness in the limbs, so that she can scarcely move them; numbness in the ring and small finger, and along the periphery of the ulnar nerve (*conium*).

Arnica.—In sanguine temperaments and after abuse of quinine; relapsing cases; especially when there is a bruised, sore feeling; must lie down, yet the bed feels too hard (*bapt.*); indifferent mood; forgets the word he is about to speak (*baryta, rhus.*); eructations bitter, and like rotten eggs (*cham.*); offensive flatus smelling like rotten eggs; drawing pains before the chill; chill in afternoon or evening, most severe in the pit of the stomach, with thirst for large quantities of cold water (*bry., cupat. perf., opp. ars.*); great heat in head, with coldness of the body; cold sensation at small spot on forehead; heat intolerable during the hot stage, but the slightest motion of the bedclothes causes chilliness; urine scanty, brick-dust sediment (*lyc.*); sour, offensive sweat, like mouldy earth.

Arsenicum alb.—In the tertian type of intermittents, when the paroxysms are either incomplete, or else well-marked and violent, and in fevers contracted at the sea-shore (*gels.*); the intermission is never clearly defined; the paroxysms appear mostly in the afternoon, and may anticipate one hour every alternate day; they sometimes recur every fourteen days; after abuse of quinine; sad, fearful, anxious mood (*ign., puls.*); great restlessness; fear of death (*aconite*); great weakness and prostra-

tion; desire to lie down (*arnica*); headache, vertigo, and paleness of face and lips; sallow, clay-colored complexion; pain and distension in the left hypochondrium; intense burning pains in the stomach and pit of the stomach; aversion to food; tongue furred at the edges, with red streak down the center, and red tip; pulse small, weak and compressible; sleepiness the night before the paroxysm (opp. *quinine*); yawning and stretching before the chill; chill irregularly developed, and frequently mixed with the heat (*nux*); internal chill with external heat and red cheeks (*calc.*); chill ameliorated by external warmth (opp. *apis*, *arn.*, *ipéc.*, *puls.*); scarcely any thirst during the chill; drinking increases the chill and causes vomiting; chilliness and shuddering without thirst, worse in the open air; external coldness, with cold, clammy sweat; the cold stage is frequently absent, the hot stage predominating; or, the chill and heat may predominate, with little or no sweat; the fever may be either wanting or mixed up with the chill, or else is intense and long-lasting; hiccough at the hour when the fever ought to have come; great restlessness during the heat; great thirst for cold water; wants little at a time, but often (*quinine*, opp. *bry.*); burning in the stomach and vomiting; great restlessness during the heat; cold, clammy sweat, with excessive thirst for large quantities of water; great weakness and prostration after the paroxysm.

Belladonna.—In quotidian and congestive intermittents, in plethoric lymphatic constitutions; masked intermittents associated with severe neuralgia; great irritability; whining mood; the hot stage predominates; chill commences in the scrobiculus cordis; shivering running down the back, and terminating in the pit of the stomach; chilliness in the arms; seldom any thirst; the face is pale when lying down, but red when sitting up (opp. *aconite*); intense burning heat inside and out; averse to uncovering; sensitive to light and noise; throbbing carotids (*glon.*); bursting headache; very red face; eruption in the corners of the mouth or on the lips; choking sensation in the throat, with dryness of the mouth; tongue is red and dry along the edges, and white in the center; the papillæ are bright and prominent (*tart. emet.*); sweat starting at the feet and passing upwards; sweat on covered parts only; sweat stains the linen yellow; the sweat stage may be entirely wanting.

Bryonia.—In intermittents after getting wet (*calc. carb.*, *rhus*); with thirst in all the stages; anticipating type; the patient is very irritable, and easily angered (*anac.*); apprehensive; dreams about business and household affairs; constipation; stools dry and hard as if burnt; gastric symptoms predominate (*ant. crud.*); patient has to move frequently; the parts feel sore (*arnica*); feels best when lying on painful side (*puls.*); stretching and drawing in the limbs; desire to lie down during the paroxysm; sitting up causes nausea and vomiting; vomiting, first of bile, then of fluids (*opp. nat. mur.*).

The chill predominates, and is creeping rather than shaking in character. Violent throbbing headache, as if the head would burst, before the chill; chill begins in the lips, tips of fingers and toes; pain, as if dislocated, in the wrist and ankle (*rhus ruta*); violent, dry, racking cough during the chill, continuing through the heat, with stitching pains; patient holds the sternum when coughing; stitches in the spleen (*ceanothus*); great thirst for large quantities of water, with cough, during the hot stage; heat on moving (*opp. bell.*, *nux*); burning internal heat, as if molten lead were running through the blood-vessels (*ars.*, *rhus*); profuse, sour, oily sweat (*china*); sweat on single parts only, or on side on which patient lies; sweat from the least exertion; all the symptoms are worse in a warm room and better in the open air.

Cactus.—In quotidian intermittents when the intermission is complete and the paroxysm returns at 11 A. M. or 11 P. M.; relapses from exposure to the sun's rays; prolonged chill not relieved by covering (*aranea*); coldness of the back, and icy coldness of the hands; long-lasting heat with dyspnoea and shortness of breath (*ars.*, *phos.*); flushes in the face; insupportable heat in the abdomen; lancinating pains in the heart (*spig.*); sense of constriction in parts; profuse sweat with unquenchable thirst.

Calcareo carb.—In leucophlegmatic temperaments; large bel-
lied individuals and persons who take cold easily; chronic inter-
mittents; the intermission is never very clear; paroxysms at 2
P. M.; thirst during the chill; chill begins at the pit of the stom-
ach with spasms, or a fixed, cold, agonizing weight; heat without
thirst; fever at 11 A. M., without thirst and without previous
chill; heat worse from bathing (*opp. fluorio acid*); profuse

sweat in the morning and on the slightest exertion; sweat without thirst; shortness of breath on going up stairs (*ars.*); undigested stools (*china*); alternate constipation and diarrhea.

Camphor.—Specially useful in pernicious malarial fevers; congestive chills; long-lasting, shaking chills; coldness of the skin; icy coldness of the whole body (*tabac.*); deathly paleness of the face (*verat. alb.*); cold, trembling tongue; heat, with distension of the veins; increased by motion (opp. *caps.*); cold, exhausting, viscous sweat; great anxiety, weakness, and exhaustion; extreme sensibility to cold air (*mur*).

Canchalagua.—In spring intermittents that are ushered in with a severe chill; the skin of the hands and feet after the sweat resembles a washerwoman's skin; patient has a good appetite during the intermission.

Capsicum.—Midsummer intermittents in stout, phlegmatic individuals; the intermission is tolerably clear; there is thirst before and during the chill; shuddering after drinking; the chill commences between the shoulders, and is relieved by putting something hot to the back; general coldness of the body; intolerance of noise; no thirst during the heat; acrid sweat; sweat without thirst; burning mucous diarrhea; appetite but little impaired; ears and tip of nose red and hot towards evening; all stages relieved by motion.

Carbo veg.—In pernicious malarial fevers; irregular paroxysms. Great prostration during the intermission; bloating of stomach between the paroxysms. Toothache, headache, and pain in the limbs precede the paroxysm; thirst only during the chill (*ign.*); icy coldness of the body and cold breath; coldness of the tongue; coldness of the knees, even in bed (*apis*); chill beginning in the left hand; (in right arm, *merc.*); left sided chill (*causticum*); heat without thirst; loquacity during the heat (*pod.*); oppressed respiration (*apis*); desire to be fanned; the fever is succeeded by severe headache; profuse sour sweat; sweat even when eating (*carbo an.*); easy to sweat and easy to chill; spleen swollen and painful; livid spots on face; foetid breath; after abuse of quinine.

Cedron.—In quotidian and tertian intermittents in low marshy regions, the chill predominates and the paroxysms recur

with clock-like regularity (*aranea*); chill preceded by great mental depression and headache; chill without thirst at 3 A. M. or 3 P. M.; icy coldness of the hands and the tip of the nose; cramps with tearing pains in upper extremities; heat with thirst for warm drinks; entire body feels numb; sweat with thirst; dry heat followed by profuse perspiration; general malaise and debility during the intermission.

Chamomilla.—In children and nervous adults; gastric complications; the patient is very irritable and restless (*bry.*); excessive sensitiveness to pain (*coffea*); thirst during the heat and sweat, none during the chill; chill usually slight, only on anterior portion of the body; shivering of single parts, and heat of others; one cheek red and the other pale; sour sweat, during sleep, mostly on the head with smarting of the skin (*caps.*); yellow coated tongue; tongue white at the sides and red in the middle (*opp. tart. emet.*); nausea and vomiting of bile, and diarrhea; frequent emissions of large quantities of pale urine.

Cinchona.—The chill is preceded by nausea, headache, hunger, anguish, palpitation of the heart and great thirst. Chilliness after every drink (*caps., cupat. perf.*); general shaking, violent chill without thirst, increased by drinking; chills alternating with heat, skin cold and blue (*nux*); thirst before the heat, none during the heat; general heat with swollen veins; cheeks, though of natural heat are red, and feel hot to the patient; canine hunger, or else aversion to food; great thirst during the sweat; sweating during sleep or on being covered; great lassitude and exhausting sweats during the intermission; ringing in the ears, and a feeling as if the head were enlarged (*calc., nux*); saffron yellow color of the skin; the patient looks jaundiced; anæmic and cachectic appearance; spleen and liver swollen, and painful on pressure; urine scanty with yellow or brick-dust sediment; all symptoms are aggravated by motion or the slightest effort.

Cimex.—The chill begins with clenching of the hands and violent rage; pain, particularly in the knee joints, during the chill, as if the tendons were too short; thirst; can drink before the paroxysm begins, but during the paroxysm drinking causes violent headache and a gagging cough with dyspnoea.

Thirst instead of fever after the chill; is obliged to urinate

after drinking; heat with pressure and gagging in the œsophagus; ravenous hunger after the heat; musty sweat, which relieves, without thirst; thirst during the intermission.

Cina.—In quotidian intermittents of scrofulous children; the intermission is never very clear, and warm symptoms predominate; frequent tickling of the nose (*phos. acid.*); clean tongue; chill ascending from the trunk to the head, with hunger but no thirst; heat with redness of the cheeks, without thirst, after sleep; sweat usually slight, at times cold, especially on the hands, forehead and nose.

Cocculus.—In children and hysteric females (*tarantula*); with spasmodic symptoms; severe colic during the chill (*magn. phos.*); aversion to sour things (*opp. ant. crud.*); obstinate constipation; all symptoms aggravated by eating or drinking.

Cornus florida.—In obstinate intermittents; the paroxysm is preceded for days by sleepiness, sluggish flow of ideas, and headache; during the chill the skin is cold and clammy; nausea and acidity of the stomach; throbbing headache during the fever; during the intermission there is debility, loss of appetite and painful bilious or watery diarrhea.

Elaterium.—When urticaria appears after suppressed intermittents; the itching is relieved by scratching (*ign. opp. rhus*).

Eupatorium perf.—In double tertians, and in intermittents that tend to run into remittents; paroxysms end with vomiting of bile; hectic cough from suppressed intermittents (*cinch.*); the intermission is apt to be imperfect, and may be attended by a loose cough; bone pains in every stage; worse on the morning of one day and the afternoon of the next; skin sallow; tongue coated white or yellow; morning diarrhea, (*podo*); great thirst, vomiting and aching pains in the extremities before the chill; soreness of the eyeballs; chill 7 to 9 A. M.; chill spreads from the back; thirst, vomiting and pains in the back and limbs as if bruised or beaten (*arn.*); noaning during the chill; chill followed by heat without perspiration; nausea and vomiting at the close of the chill, aggravated by drinking; thirst during the heat, with bitter vomiting, headache, and pain in the limbs; shivering during the heat; sweat may be scanty or absent; it is slight or wanting when the chill is severe; or *vice*

versa; perspiration increases the headache, but relieves all the other pains, (*nat. mur.*).

Eupatorium purp.—In tertian intermittents; during the intermission, vertigo with sensation of falling to the left; desire for cold acid drinks, (*calc. sulphide*.); tongue coated and brown in the center; deep, dull pains in the kidneys (*berb.*); pains in the arms and legs before the chill; chill begins in the lumbar region (*luch.*); severe pains in the bones with numbness of the legs; frontal headache; blueness of the lips and nails (*nux.*) violent shaking with little coldness; thirst during the hot stage; long lasting heat followed by hunger; sweat mostly on the upper part of the body, and usually slight.

Ferrum.—In protracted intermittents after the abuse of quinine, when there are anæmia, debility and great muscular weakness; extreme paleness of the face, and of the mucous membrane of the lips and mouth; ague-cake, (*oceanothus, berberis vulg.*); vomiting as the chill appears; thirst with the chill; hands and feet cold and numb; no thirst during the hot stage; rush of blood to the head with flushes of heat in the face, hot flushes, (*kali carb.*); red cheeks; sensations of heat all over the body, which is cold to the touch (opp. *baryta carb.*); heat in palms of the hands and soles of the feet; profuse, long-lasting, debilitating sweat; sweat, clammy, strong smelling, and stains the linen yellow; all the symptoms are aggravated by sweating (opp. *nat. mur.*).

Gelsemium.—In recent uncomplicated quotidian intermittents, occurring in children and nervous young people; the paroxysm usually begins in the evening, though the fever may recur alone at 10 A. M.; the intermission may be short or wanting, and there is great muscular prostration; the chill begins in the hands and feet, and is unattended by thirst; the fever may be intense and burning, and accompanied by a sensation of falling, especially in children; there is great mental anxiety, redness of the face and nervous restlessness during the hot stage; the sweat is apt to be profuse, and relieves the pain (*nat. mur.*, opp. *ferrum.*); sweat most profuse on the genitals.

Calcium Sulphide.—After abuse of mercury or potassium iodide; the patient is very sensitive to the cool air; fainting from the slightest pains; urticaria before and during the chill; violent shaking chill every morning without heat; burning heat

with headache and unquenchable thirst for acid drinks; sleepiness; intolerance of light; herpes around the mouth (*nat. mur.*); continuous, profuse sweat without relief, increased by motion; offensive, sour-smelling sweat at night; sweat on perineum, groins and inside of thighs.

Ignatia.—The intermission is complete; yawning, stretching, and shuddering before the chill; chill commences in the arms; twitching in the deltoid, (in biceps or triceps, *fluor. acid*); shivering chill with redness of the face; chilliness relieved by external heat, (*ars.*); thirst for large quantities of water, only during the chill, (*caps.*); external heat and redness without internal heat; one side of the face red and burning, (*arn., cham.*); urticaria over the whole body during the heat with violent itching, relieved by gentle scratching, (*elaterium*); desire to be uncovered during the heat; fainting as the hot passes into the sweating stage; sweat usually slight, most on the face.

Iodine.—Quartan fevers in scrofulous individuals; emaciation; ravenous hunger, cannot be satisfied; constant diarrhea during the intermission; tenderness and hardness in the left hypochondrium; ague-cake.

Ipecacuanha.—In quotidian and tertian intermittents, and in cases that have been maltreated with quinine and arsenic; relapses caused by errors in diet, (*puls.*); the paroxysm is preceded by yawning, stretching and salivation, and the intermission is never very clear; nausea is present in all the stages; the prostration is greatest during the chill; the chill is aggravated by external warmth, (*apis*, opp. *ars.*, *ign.*); chill is lessened by drinking, (opp. *eupat. perf.*, *cimex*); nausea and vomiting, and dry, hacking cough during the heat; alternate coldness and paleness of the face; sour sweat, stains yellow; turbid urine; symptoms worse during the sweat.

Lachesis.—In tertian intermittents in drunkards and in women during the climacteric period; annual spring attacks (*carbo. veg.*); after abuse of quinine; all symptoms are worse after sleep; throat is very sensitive to the touch; filiform pulse; the chill predominates, and begins in the small of the back, (*eup. purp.*); chill is relieved by the heat of a stove, and by being firmly held; shivering when moving the bedclothes, (*nux. vom.*); chill and heat alternating, and changing from place to place;

great talkativeness during the heat, (*marum ver.*) which is generally irregular; heat with desire to uncover; cyanosis during the fever; perspiration in axilla smelling like garlie; profuse sweat which affords relief.

Lycopodium.—In quotidian and tertian intermittents; irregular types; great fear of being left alone (opp. *cinch.*); yellowish-gray color of the face (*ars.*); abdominal flatulence; sour eructations and sour vomiting; vesicles on the tongue; obstinate constipation; increased micturition; paroxysm at 6 to 7 P. M.; yawning and nausea before the chill; chill starting from the back; shaking chill, great coldness even in bed, as if lying on ice; left sided chill (*carbo. veg.*, opp. *bry.*); numb, icy cold hands and feet; cutis anserina; chilliness in the morning, followed by great heat; sour vomiting between the chill and the heat; sour vomiting during the hot stage; sore, pressive pain in the region of the liver; burning as from glowing coals between the scapulae; profuse sour sweat on the body; perspiration immediately after the chill (*caust.*); thirst after the sweat.

Menyanthes.—In irregular intermittents when the cold stage predominates; quartan fevers; ravenous hunger; great desire for meat (opp. *sulph.*, *arnica*); coldness of the distal parts; coldness in the abdomen, aggravated by pressure; the hands and feet are icy cold, the rest of the body warm; great heat without thirst; flushes of heat with hot ears and cheeks; sweat continuing all night.

Natrum mur.—In quotidian intermittents in new districts; after abuse of quinine; the intermission is never very clear; sallow complexion; stitches in the hepatic region between the paroxysms; loss of appetite; bitter taste (*bry.*, *puls.*); dry, white-coated tongue; feeling as of a hair on the tongue (*kali bich.*); herpes on the lips, (*ars.*); ulceration of the corners of the mouth; frequent vomiting of water and mucus before the chill; chill from 10 to 11 A. M.; long-lasting, violent chill with blueness of the lips and nails (*nux*); thirst for large quantities of water and often (*bry.*); prolonged heat with thirst; hammering frontal headache; excessive weakness during the heat; red sandy sediment in the urine (*lyc.*); cutting in the urethra after micturition; profuse sweat which relieves all the pains except the headache (*eupat. perf.*).

Nux vomica.—Anticipating intermittents in thin, slender individuals; irregular paroxysms, at night or early morning; gastric and bilious symptoms predominate; tongue coated, white or yellow; must rinse the mouth, it tastes so bitter; constipation; soreness of the spine; extremities feel as if paralyzed at the onset of the chill; heat or sweat, occasionally before the chill; shaking chill with blueness of the face and hands; pain in the sacrum during the chill; severe, long-lasting chill, not relieved by warmth; congestive chills; great thirst, especially for beer, during the heat; long-lasting, burning heat, yet can neither uncover nor stir without feeling chilly; headache, vertigo, pain in chest and vomiting during hot stage; sweat without thirst; profuse sweat after the severest paroxysms; chilliness on moving the bedclothes; extreme sensitiveness to the cold air (*camph., cocc.*).

Opium.—Is especially adapted to children and old persons; great drowsiness in all the stages; stertorous breathing; face bloated, dark red and hot; twitching of the extremities; congestive chill.

Podophyllum.—In bilious temperaments; loss of appetite; breath offensive and disgusting to the patient; tongue coated white, shows the imprints of the teeth (*merc.*); morning diarrhea, changeable in character; pressing pains in the region of the liver and spleen; severe backache before, but not during, the chill; chill at 7 A. M.; great loquacity during the chill; dull aching in the joints of the extremities; no thirst during the chill; heat with excessive thirst, commencing even during the chill; violent pains in the head; profuse sweat; sleeps during the sweat (*apis*).

Polyporus.—In stubborn quotidian intermittents; the intermission is short and the paroxysm begins mostly in the morning; there is considerable derangement of the abdominal viscera, with dull headache and jaundiced skin; numb sensations after the paroxysm; chill begins in the inter-scapular region (*caps.*); headache; slight thirst; mild but long-lasting fever; inertia and lassitude; very little thirst during the fever; the face is hot and flushed; slight but long-lasting sweat without thirst; rarely of service in autumnal intermittents.

Pulsatilla.—Adapted to women and children, and to individuals of mild, sensitive temperament; irregular types; quartan intermittents; relapses from dietetic errors; recurring every fourteen days; all stages of paroxysm are mild and frequently mixed up; constant chilliness and headache during the intermission; changing symptoms; tongue thickly coated, white or yellow, and covered with a tenacious mucus; bad taste in the mouth in the morning; disgust for fat food (opp. *nux*); mucous diarrhea; profuse watery urine; diarrhea and drowsiness the day before the paroxysm; chill at 4 P. M., without thirst; one-sided coldness; chilliness over the abdomen extending around to the back; acidity of the stomach, and vomiting of mucus and bile; chill and heat simultaneous (*ars.*); dry heat of the body with distended veins, and burning hands; thirst only during the heat; external warmth is intolerable (*sepia*); desires to be uncovered (*apis*); feels for cool places in the bed; one-sided sweat, mostly on the left side; talkativeness when sleeping during the sweat; chlorotic states; menstrual irregularities.

Quinine.—(*Chinium sulph.*) In tertian intermittents when the paroxysms recur at the same hour; and in quotidian intermittents that anticipate two hours every day; the intermissions are clearly defined; there is great debility, prostration and thirst between the paroxysms; the urine is fatty and deposits a straw yellow or brick-dust sediment; pain in the region of the liver and spleen; ringing in the ears; dizziness and enlarged feeling in the head; pain in the dorsal vertebræ on pressure, during the paroxysm; decided shaking chill with thirst at 3 P. M.; shaking chill with severe pains in the left hypochondrium; chill with blueness of the lips and nails (*nux*); heat, with great thirst; general heat, with redness of the face; enlargement of the veins of the legs and arms; delirium during the hot stage; heat gradually passes into sweat; violent heat, with frequent yawning and sneezing, followed by copious sweat; sweat, with thirst; profuse sweat during perfect quiet; sweat relieves all other symptoms, but aggravates the headache; drinking is generally grateful and affords relief.

Rhus tox.—In quotidian intermittents which tend to run into remittents; relapses from getting wet; evening paroxysms; burning in the eyes; yawning and stretching, and a feeling in the maxil-

lary joint as if sprained, before the paroxysm; dry, teasing cough before and during the chill (*rumex*); none during the heat; (during the heat, *aconite*); tongue coated white with red, dry, triangular tip; stretching and pain in the limbs; chill aggravated by drinking; constant chill, as if cold water was poured over him (*led.*); feeling as if the blood was running cold through the vessels (opp. *ars.*); alternately red and pale face; fever may either precede or succeed the chill; excessive heat as from hot water running through the vessels; great restlessness, constantly changing position (*ars.*, opp. *bry.*); thirst for cold water or cold milk; drinks little at a time but often; profuse sour morning sweats; sweat even during the heat; sleep during the sweat; urticaria which passes off with the sweat.

Sabadilla.—The chill predominates; chill always passes from below upwards (opp. *verat.*); dry, spasmodic cough during the chill, with tearing in the limbs; paroxysms recur at the same hour (*aran.*, *cedron*); constant chilliness during the intermission; alternate attacks of hunger and loathing of food.

Sambucus.—When the perspiration continues through the intermission; profuse sweat when awake, dry heat during sleep; deep, dry, racking cough, for half an hour before the chill.

Sepia.—In chronic cases; intermittents in pregnant and nursing women; monthly paroxysms; perfect absence of thirst (*puls.*); coldness begins in the feet and passes upwards; chilliness from motion (*nux*); sensation as if the limbs and fingers were dead; icy cold and damp feet all day, like standing in cold water; external warmth unbearable (*puls.*); flushes of heat (*sulph.*); vertigo; sensation as if hot water was being poured over him, during the heat; profuse sweat in the morning after awaking.

Sulphur.—In chronic cases and in chronic malarial cachexia; great prostration after every paroxysm (*ars.*); with thirst for beer; diarrhea in the early morning; chill begins in toes or sacrum; icy coldness of the genitals; dry skin with heat and burning in the soles of the feet during the fever; sweat from the least exertion (*merc.*); profuse sweat at night, with restlessness; sulphur is often serviceable to arouse the reactive power of the system.

Veratrum alb.—In pernicious malarial fevers; children's

intermittents, when the paroxysm begins at 6 A. M.; severe long-lasting chill; chill with coldness and thirst; profuse cold sweat, with deathly paleness of the face; desire for cold drinks; great exhaustion during the intermission.

TREATMENT FOR THE SEQUELS.

Merc. bin-iod.—For enlarged spleen. It may be given internally from the 2nd to the 6th trit., and also used as an ointment, of five per cent. strength, externally.

Phosphorus for deranged liver.

Chelidonium for obstinate neuralgia of the fifth nerve, after masked intermittents.

Arsenicum and Natrum Mur. for chronic malarial cachexia.

Ferrum or *Arsenate of Iron* for anæmia and debility before the occurrence of cedema; and *Pulsatilla* when chlorosis and hydræmia have been induced.

PALLIATIVE AND DIETETIC TREATMENT.

During the intermission a nutritious diet should be indulged in. Meat essence or beef tea, tender meat, milk, and frequently wine may be taken.

When gastric irritability continues during the intermission, benefit will accrue from the use of milk or beef tea and pepsin enemas. At the onset of the paroxysm the patient should take to the bed, and abstain from all manner of food until it is over. During the stage of chill relief is frequently experienced from galvanism applied to the spine. Too much covering is generally burdensome, and should not be allowed. Should this stage be protracted, or the vital powers become weakened, stimulants and external warm applications must be resorted to. As the hot stage approaches the bed-covering may be gradually removed, and the body frequently sponged with tepid water if the heat is very great. During the sweat stage allow the patient to rest; wipe away the sweat with warm cloths, and change the linen when the sweat is excessive.

Use stimulants whenever there is a tendency to collapse in debilitated subjects. But unless specially needed all alcoholic beverages should be strictly avoided.

LECTURE V.

Simple Remittent Fever.

I shall invite your attention this morning to the second in our list of malarial fevers, namely: Simple Remittent Fever.

Definition.—A continued fever with daily exacerbations, due to the presence of the bacillus malarie in the blood. It is ushered in by a chill, and is characterized by frontal headache, epigastric uneasiness, functional disturbance of the liver and occasionally jaundice. Toward the end of the first week the daily remissions may become less and less distinct, and typhoid symptoms supervene. The average duration of simple remittent fever is two weeks. Mild cases may terminate within six days. Uncomplicated cases rarely prove fatal. After death, evidences of catarrhal inflammation of the intestinal tract, with bronzed liver, and pigmentation of the blood and tissues are found.

Synonyms.—Bilious fever, bilious remittent fever, continued fever, acclimative fever.

Historical Notice.—Simple remittent fever is pre-eminently a disease of warm climates and malarial districts. In this country it is most prevalent in the southern and western states, and may be endemic during the summer and autumn months. It is the fever of Hungary, Africa, and the Pontine marshes of Italy. Alexander the Great, James I. and Oliver Cromwell are said to have died of it.

Etiology.—This has been considered already in our lecture

on simple intermittent fever. No doubt can at the present day be reasonably entertained but that an intenser action of the same malarial poison—the bacillus malarie—which gives rise to intermittent fever, can produce remittent fever. Malarial epidemics frequently begin as intermittents, change to remittents at their height, and return to intermittents during their decline. As a rule, the two forms of fever do not prevail in the same locality at the same time. Sporadic cases due to peculiarities of constitution and differences in susceptibility to the poison may however occasionally occur within the same area. In the same latitude, malarial fever may be remittent along the sea coast, and at the same time intermittent on the high lands. Simple remittent fever has the same geographical limits, and is governed by the same laws of development and distribution, as simple intermittent fever. Its boundaries, from 63° north latitude to 57° south latitude, encircle the earth as with a broad, irregular belt, running in the main parallel with the equator. At the northern and southern limits of this malarial zone the types of fevers are rare as to frequency and mild in character, but become extremely prevalent and severe on approaching the equator. Other things being equal, remittents require a higher average range of temperature than is necessary for the development of intermittents.

Clinical History.—The premonitory stage of this disease is usually short, but its attending phenomena are well marked. The initial symptoms are those of general malaise, with headache, sleeplessness and oppression in the epigastrium. After twenty-four or forty-eight hours the attack commences, not gradually but abruptly, and mostly with a chill. As a rule, the chill is not so severe nor of as long duration as that of intermittent fever. It appears as a general coldness of the surface, rather than as a shaking of the body with chattering of the teeth. During the chill, as in the cold stage of intermittents, the thermometer in the axilla will show a rise of two or three degrees in the temperature of the body. Accompanying the chill there is intense headache, with pain in the back and limbs. Following the chill, which is from half an hour to an hour in duration, the febrile condition appears, and continues unabated for six, twelve, or even forty-eight hours. The temperature may at this period of the attack reach 105° or 106° Fahr. The skin becomes hot, dry and harsh. The pulse increases in force and

frequency; but seldom exceeds 110 or 115 beats to the minute. The face becomes flushed and the eyes suffused. The patient is restless, sleepless, and incapable of mental exertion. The oppression and tenderness at the epigastrium increase, and nausea and vomiting become more persistent. The vomiting is at first of the contents of the stomach, and afterward of a stringy mucus, tinged with green. In severe cases, black vomit may occur. The tongue becomes coated, and there is great thirst. The urinary secretion becomes scanty, and is loaded with urea. The bowels are usually constipated at the beginning of the attack. When diarrhea occurs, the stools are tinged with bile. After continuing with increasing severity from ten to twelve hours, these symptoms begin to subside; a slight perspiration appears upon the forehead, and extends in a short time over the entire body; the pulse falls ten or twenty beats per minute, but never reaches the normal. The thirst diminishes and the irritability of the stomach lessens. The headache almost disappears and the patient falls into a quiet and refreshing slumber. The temperature declines as the symptoms abate, but never entirely reaches the natural standard. Usually in from four to twenty-four hours the febrile movement re-appears with increased severity, preceded or not by a slight chill. The patient's discomfort again increases, and the restlessness becomes extreme. The headache returns, and delirium may at times appear. The gastric symptoms are now marked and severe. The tongue is thickly covered with a yellowish coating. The skin becomes hot, dry and jaundiced.

All the symptoms of this, the second exacerbation, resemble those of the first, but are more severe and of longer duration. The partial subsidence of the fever is attended by a less profuse perspiration than during the primary paroxysm, and the remission is not so well marked.

The period of increase of fever is known as the *exacerbation*. The time that elapses between the subsidence of the fever and the appearance of the exacerbation is called the *remission*.

Exacerbations and remissions are characteristic of a fully developed case of simple remittent fever. The exacerbations are apt to occur about midday, and the remissions at midnight. In protracted cases the remissions may not occur until morning. Oftentimes the paroxysm follows the double tertian type, and

then the exacerbation occurs one day in the morning and the next day in the afternoon. In severe attacks, the paroxysm may be that of a double quotidian. One paroxysm will then appear at noon and another at midnight; the remissions taking place in the evening and morning.

After the second paroxysm the advance is various. Usually on the third day the exacerbation again appears, severer in form and of longer duration than the preceding one. The remission succeeding is proportionately more incomplete. From day to day the febrile symptoms continue to recur and abate, until the remissions disappear and the fever assumes the continued type, or else become more marked, and eventually pass into intermissions. In favorable cases the disease shows signs of decline after the fifth exacerbation. If, however, the disease progresses, by the end of the first week the remissions are no longer discernible, and the fever becomes a continued fever.

Each returning exacerbation from this time on tends only to lower the patient into that typhoid state which is frequently mistaken for typhoid fever, but which is liable to occur in all fevers. The skin now feels extremely dry and harsh; the countenance is dark or flushed; the tongue becomes parched; dark and black matter, called *sordes*, collects upon the teeth; a brownish diarrhea at times takes the place of the constipation. In some cases there is local tympanites. Muscular debility is usually great. The pulse numbers 120 or 140 beats per minute, and is small, thready and feeble. All the symptoms deepen, and ataxic phenomena appear. Deglutition becomes difficult. The patient is unable to raise himself, and is continually sliding down in bed; his hands tremble, and there is *subsultus tendinum* and *carphologia*.

This order of things may continue for a week or ten days; when, if the patient is to enter upon convalescence, remissions, frequently attended by a critical discharge from the kidneys, bowels or skin, become more and more marked, and the febrile exacerbations gradually disappear. In fatal cases the remissions do not take place, but the typhoid symptoms deepen, and death ensues either from exhaustion or as a consequence of complications. Death from exhaustion occurs more among the aged, and in intensely malarial regions. Otherwise, death within the first three weeks is almost always the result of inflammatory

complications. Meningitis, gastritis and pneumonia are among the most frequent complications; while chronic hepatitis and splenitis appear later, and may be considered as sequels rather than as complications. The sequels are oftentimes more to be dreaded than the disease. .

When simple remittent fever is accompanied by a more than usually severe gastro-hepatic catarrh, as evidenced by excessive bilious vomiting and jaundice, it has been termed by some writers, bilious remittent fever.

ANALYSIS OF CHART.

Chill.—The onset of the fever is generally abrupt, usually with a chill. The chill is less complete and of shorter duration than that of either intermittent fever or pneumonia. A general coldness of the surface is present at the beginning of the chilly sensation. The shaking of the body and chattering of the teeth, common in intermittents, are not experienced in remittents. There is rarely a marked chill after the first paroxysm.

Paroxysms.—The paroxysms during the first week are made up of exacerbations and remissions. When the fever is prolonged into the second week the remissions disappear, and reappear only as convalescence begins to be established. The temperature of simple remittent fever varies from 100° to 105° Fahr. During the first two days it is from 1° to 2° lower during the remission than during the exacerbation. At the time of the initial chill it is from 2° to 3° above the normal. After the third day, unless convalescence sets in, there is but little fluctuation.

The Circulatory and Respiratory Systems.—The pulse increases in frequency as the temperature rises, and may reach 110 or 120 beats per minute, in the primary paroxysm. During the first remission it may fall ten or twenty beats per minute. After the third paroxysm it becomes more frequent, and is apt to be small, thready and feeble. The respirations are moderately accelerated during the exacerbations of the first week, and may range from 20 to 25 per minute in uncomplicated cases. During the period after the first week the respirations may be either hurried and shallow, or else abnormally slow.

The Nervous System.—Headache is one of the earlier and more constant symptoms. It is usually present among the prodromes. It is most severe during the first week, and terminates

CHART III.—*Simple Remittent Fever.*

Premonitory Symptoms:		Malaise, Nausea, Cephalalgia, Coated Tongue.		
Initial Symptoms:		Abrupt chill. A general coldness, lasting from ½ to 1 hour.		
General Symptoms:		During first week.		After first week.
Paroxysm:	Form,	Quotidian, Double Tertian or Double Quotidian.		Continued fever. Exacerbations without remissions.
	Stage,	Exacerbation,	Remission.	
Temperature:		103° to 106°.	PARTIAL SUBSIDENCE OF ALL SYMPTOMS: The temperature and pulse never reach the natural standard.	103° to 106°.
Pulse:		Full, 110 to 120 per minute,		Small and feeble, 120 to 140 per minute.
Respiration:		Hurried,		Quick.
Nervous system:		Throbbing headache, Restlessness, Sleeplessness,		Active delirium, Subsultus tendinum, Carphologia.
Stomach:		Thirst, nausea, Epigastric uneasiness. Vomiting of green, stringy mucus		Vomiting less constant.
Face:		Flushed,		Flushed.
Eyes:		Suffused,		Dull and expressionless.
Muscular system:		Violent pain in back and limbs,		Great muscular debility.
Urine:		Scanty, .		Loaded with urea.
Skin:		Dry—yellow,	Slight perspiration,	Dry, hot and jaundiced.
Tongue:		Yellow coating.		Dry and fissured. Sordes on teeth.
Bowels:		Constipated. Diarrhoea at close of week.		Brownish diarrhoea.
Complications:		Meningitis, Cerebritis, Gastritis, Enteritis and Pneumonia.		
Sequels:		Chronic hepatitis and splenitis.		
Duration:		14 days. May terminate before the fifth day.		
Prognosis:		Favorable.		
Etiology:		The Bacillus Malaræ.		

after that time upon the advent of delirium. Wakefulness is often a prominent and annoying symptom. Subsultus tendinum, carphology or grasping in the air, and picking at the bedclothes, may appear during the typhoid state in cases prolonged beyond the first week.

The Digestive Tract.—The affections of the digestive system consist mainly of perverted functions, and of catarrhal conditions of the mucous membrane of the alimentary tract. The tongue is at first coated with a whitish or yellowish-white fur. The edges present, as in malarial diseases generally, a pectini-form appearance; the margins are smooth, and both present a clearer appearance and a brighter hue than the remainder of the surface of the organ. After the first week, in severe cases, the tongue becomes parched, and at times cracked. Sordes begin to collect upon the gums and teeth, if the fever runs high and is prolonged beyond the first week.

Thirst is a prominent symptom, especially during the exacerbation. Nausea and vomiting are invariably present. The matters ejected usually consist of thin, stringy mucus, tinged with green. In severe attacks there may be a slight amount of black vomit. Epigastric tenderness is generally well marked. The liver is slightly enlarged in most cases. Constipation is a common symptom. When diarrhea occurs, it is usually mild, and the evacuations are brownish in character. In rare cases it may be so excessive as to endanger the life of the patient from prostration. The skin is generally dry and more or less jaundiced.

Morbid Anatomy.—The pathological changes of simple remittent fever resemble very much those of simple intermittent fever. And as both types of fever are due to the action of the same malarial poison, with only a difference in quantity, the same characteristic changes in the blood are experienced in both with a difference only in degree. The number of red blood globules is diminished in both, as is also the amount of fibrin and albumen. And there is an accumulation of a variable amount of yellowish-red, brown or black pigment matter. This pigment matter (Fig. 9) is present in the form of granules or of cells containing granules, in the blood, spleen, liver, kidneys, brain, spinal cord, etc. These granules are oftener present in remittent than in intermittent fever. Their accumulation in the

general circulation can easily be shown in a drop of blood drawn during life, after a series of paroxysms have occurred. By some writers the spleen is thought to be the point of origin of this pigment matter; and by others the pigmentation is believed to be due to the hæmatine, which has escaped from the corpuscle in consequence of changes in the plasma as regards the amount of albumen and sodium chloride it contains. The latest and most probable theory is that the granules owe their origin to the changes in the red corpuscle, caused by the destructive action of the bacillus malarie.

The spleen is somewhat enlarged in simple remittent fever, but not to the same extent as in simple intermittent fever. The tumor seldom extends below the margin of the ribs. The changes in the alimentary tract are such as attend gastro-intestinal catarrh. The mucous membrane of the stomach and intestines is more or less congested, thickened and softened. In the intestinal canal, the Peyerian patches are usually enlarged, and at times ulcerative changes may have taken place. The mesenteric glands are frequently hyperæmic, but are neither enlarged nor granular.

The Liver.—The characteristic pathological lesion of remittent fever is the *bronzed liver*.

This discoloration is uniformly present, though it may vary in degree in different types. It is bronzed without and olive-green within, and is due to the pigmentation of the liver tissues. The organ is seldom much increased in size.

Differential Diagnosis.—Simple remittent fever is readily distinguished from simple intermittent fever. Each paroxysm of simple intermittent fever begins with a chill; while in simple remittent fever, after the primary paroxysm, there is rarely a marked chill. In intermittent fever there is a time when the patient is free from fever—the intermission; while in remittent fever, there is no time, not even during the remission, when the patient is entirely free from fever.

The symptoms in remittent fever simply grow and decline, they do not as in intermittent fever, appear and disappear.

Remittents often pass into intermittents, and vice versa. Simple remittent fever ought not to be confounded with typhoid

fever. And yet, after the patient has passed the first week and entered the typhoid state, the mistake may easily be made.

The sudden appearance of remittent fever stands in marked contrast to the insidious approach of typhoid fever. The range of temperature during the first week is very different. During the first week the remissions are very distinct in remittent fever, and there is frequently marked jaundice. The gastric symptoms (nausea and vomiting) are common and severe in remittent, but quite rare in typhoid fever. Pigment granules are generally present in the blood of remittent fever patients, but are never found in typhoid fever. Epistaxis, bronchitis, and the rose-colored spots so common in typhoid fever, are seldom seen in the typhoid state of remittent fever.

The "pea-soup" discharges of typhoid fever are entirely different from the brownish evacuations of remittent fever. The livid countenance, sleeping stupor, deafness, and tympanites are almost peculiar to typhoid fever.

The post-mortem changes are gastric and hepatic after remittent fever, and enteric and splenic after typhoid fever. Remittent fever is developed only in malarial districts; while typhoid fever frequently prevails where remittents are unknown.

Remittent fever differs from typho-malarial fever in the early appearance of enteric symptoms, and the well-marked typhoid phenomena of the latter. Typho-malarial fever has usually a longer prodromal stage than simple remittent fever.

The differential diagnosis between simple remittent fever and yellow fever is sometimes attended with considerable difficulty. Pigment granules are found in the blood of remittent fever patients, but not in that of yellow fever victims.

Hemorrhage from the stomach, and albuminous urine, though seldom found in remittent fever, are frequent symptoms in yellow fever. The headache of yellow fever is occipital, while that of remittent fever is frontal. One attack of yellow fever protects from a second, while one attack of remittent fever rather predisposes to another attack.

In yellow fever death may take place on the third day. The severest cases of remittent fever never end fatally before the seventh day. Simple remittent fever is always a country fever, while yellow fever is a disease of cities and sea-port towns.

Prognosis.—The prognosis in simple remittent fever is gen-

erally good. In our latitude fatal cases should rarely occur. As a rule, the prognosis is less favorable in tropical than in temperate climates. In the southern states where the severe forms are encountered, a fatal termination is of frequent occurrence.

The favorable indications are: The early subsidence of the gastric symptoms; a lowering of the temperature range and a decrease in the frequency of the pulse; a turbid appearance of the urine and the formation of vesicles about the lips. Decided and prolonged remissions accompanied by copious perspiration are always signs of approaching convalescence.

On the other hand, short and incomplete remissions with a tendency to collapse at the close of the exacerbations are unfavorable signs. Other suspicious symptoms are increased frequency and extreme weakness of the pulse; dryness and blackness of the tongue; hiccough; intense icterus, and retention or suppression of urine. The advent of cerebral symptoms or of pneumonic or gastric complications are additional alarming danger signals.

An attack of simple remittent fever predisposes to subsequent attacks of simple intermittent fever, while such sequels of the latter disease as enlargement of the spleen, anæmia and general dropsy, occasionally follow.

Duration.—The average duration of simple remittent fever is fourteen days. Favorable cases often terminate in an intermission on the fifth day. Severe or ill-managed cases may be protracted for three, five or even six weeks.

Treatment.—The prophylactic treatment is the same as for intermittent fever.

Gelsemium, *bryonia*, *cupatorjium* and *quinine* are the principal remedies during the attack.

Gelsemium is especially useful during the first week, and will often terminate the fever before the fifth day; it is adapted to cases coming on in the autumn, and recurring in spring; in infantile remittents it is a valuable remedy; the exacerbations are apt to occur at midnight, while the remissions appear in the morning, and are frequently accompanied by perspiration; there is early and almost complete loss of muscular power; the pulse is large, full and quick, but not very hard; the face frequently has a crimson flush; there is intense frontal or occipital head-

ache; the head feels as big as a bushel; the tongue has a pale red color or else is covered with a yellowish white coat, and there is a slimy, bitter taste in the mouth.

Bryonia, like gelsemium, is particularly indicated during the first week of the fever. It is adapted to pale complexioned, irritable people. The exacerbations come on in the afternoon, and the remissions are not well marked. The headache is a painful pressure or tearing pain, relieved by lying down. Delirium, when it occurs, is usually about business affairs. The tongue is thinly lined with mucus; the lips are parched, dry and cracked; the taste is flat and pasty; the vomiting is bilious in character, and occurs especially after drinking; the bowels are constipated, or else the discharges are diarrheic mixed with mucus, and of a deep brown color; the urine is either watery and clear, or else yellow with a yellow sediment. At times there is a marked disposition to perspire.

Eupatorium perf. is adapted to summer and autumn remittents that are attended by severe bilious symptoms; there is intense occipital headache; the tongue is coated with a thick, yellow fur; vomiting occurs after drinking; there is fullness and tenderness in the hepatic region, with stitches and soreness on moving; the urine is scanty and dark colored. Aching in the bones with soreness of the flesh stands out as a prominent characteristic in remittent as well as intermittent fever.

Ipecac may be needed when the gastric irritability is strongly marked; there is frontal headache, with disgust for food, especially greasy food; nausea, with regurgitation of the ingesta; pale yellow color of the skin.

Podophyllum renders excellent service when there is much intestinal irritation, and the febrile symptoms are strongly marked; the gastro-intestinal and hepatic symptoms predominate; there is violent headache with excessive thirst; at times the headache alternates with diarrhea; the evacuations are bilious in character, and there is a sense of fullness in the hepatic region, with twisting pains; sallowness of the skin is a common attendant.

Quinine will be of service at the commencement or at the close, when the remissions are well marked, and the fever as-

sumes a more or less distinctly intermittent type; it should be administered only during the remission; the pulse is frequently fluctuating in character; it may be weak and thready during the remission, but full and compressible during the exacerbation; humming in the ears, with a sense of lightness across the vertex, or with a sense of rumbling through the occiput is a strong indication for this remedy.

Mercurius may prove useful in weak, delicate individuals, during the first week, when there is intense fever in the evening, most violent at midnight; the eyes and skin are yellow; the headache is worse on lying down; the taste, eructations and vomiting are all bitter; there is great desire for sour or piquant things; the tongue is lined with whitish mucus or a dirty yellow fur; the evacuations from the bowels consist of large quantities of bile and mucus; the stomach and liver are sensitive to pressure; the urine is of a dark red color, as if mixed with blood.

Nux vomica in irritable sanguine temperaments; it is mainly useful in the early stages; the patient is exceedingly irritable and wishes to be alone; the complexion is bright red with a yellowish tinge; the tongue is dry or coated, with bright red edges; adapted to men more than to women.

Baptisia.—After the first week, for the early stages of the typhoid state; there is great nervous restlessness; the patient thinks the head is scattered over the bed; must toss about to get the pieces together; sensation as though there were a second self beside the patient in the bed; the headache is dull and stupefying; the patient falls to sleep in the midst of an answer; the stupor resembles that of arnica and opium; the pulse is full and slow; the tongue is dry, with a brown streak down the center; the breath is foetid; sordes collect on the teeth; there is sinking at the stomach, and the patient can swallow only liquids; the urine is high-colored, and the evacuations from the bowels are dark and offensive.

Opium is indicated after the first week for the comatose state; the stupor is complete; the respirations are stertorous; the stools are involuntary, and the face is dark, red, and bloated.

Rhus tox. for coma, less pronounced than that of opium; the mental operations of the patient are slow and difficult; there is

restless sleep with frightful dreams; the patient talks incoherently; the tongue is red at the tip in the shape of a triangle; the lips are dry and covered with brown crusts.

Hyoscyamus for continuous delirium, illusions and hallucinations; the patient jumps out of bed and attempts to run away; he has no wants except thirst; there is muttering, with picking at the bedclothes, and at times *subsultus tendinum*; the tongue is red or brown, dry and cracked; the stools are involuntary.

Belladonna for violent delirium with attempt to run away, to strike, bite or spit at attendants; there is a disposition to tear things to pieces; the symptoms point to brain congestion; the tongue is red at the margin and white in the centre.

Arsenicum alb. may be needed for asthenic conditions in cases prolonged beyond the first week; weak, debilitated individuals often require arsenic during convalescence.

Pulsatilla in fevers that run a slow course; it is suitable to women and children more than to men; the exacerbations take place in the evening; there is extreme aversion to animal food; the taste is bitter, and there is vomiting of mucus and bile; there is a whitish mucous coating on the tongue; the stomach and liver are sensitive to pressure; there is nightly diarrhoea, and the stools are watery or green like bile; *pulsatilla* will often relieve the excessive hunger that appears during convalescence.

Crotalus and **Phosphorus** have been suggested for the intense icterus of remittents in southern latitudes.

For further therapeutic indications I will refer you to the treatment of simple intermittent fever, as given in the previous lecture.

LECTURE

Pernicious Fever.

The third and last of the fevers caused solely by the presence in the human organism of the highly active malarial poison—the bacillus malarie—is Pernicious Malarial Fever.

Definition.—It is a malignant and destructive malarial fever, characterized by special dangerous local affections in important organs. It may take the form of either an intermittent or a remittent. The pernicious attacks are of the tertian or quotidian type, and may occur at any time of the day or night. The pernicious symptoms usually appear with the second or third paroxysm. Pernicious fever is not infrequently epidemic, and may assume one of the following varieties: the *comatose*, the *delirious*, the *choleraic*, the *algid*, the *colliquative* or the *icteric*. It tends to terminate fatally unless controlled before the third paroxysm.

Synonyms.—It has been called Congestive fever, Malignant Intermittent, Malignant Remittent, Ardent fever, Jungle fever, and Tropical typhoid fever.

History.—Pernicious fever is a rare disease in northern latitudes, but is quite common in the vicinity of the rice plantations of the southern states. It tends to prevail at certain epochs in warm and intensely malarial districts. Dr. Daniel Drake states that of the interior valley of North America, the regions in which it has most frequently prevailed are, “the level portions of Alabama, Mississippi and Louisiana, the southern shore of Lake Michigan from Chicago around to St. Joseph river, and

of Lake St. Clair and Lake Erie, from Lake Huron to Lake Ontario, near the estuaries of the creeks and rivers."

Etiology.—The exciting and predisposing causes of pernicious fever are similar to, but more intense than those of the other malarial fevers. A higher average range of temperature (65° Fahr.), than is necessary to produce either simple intermittent or simple remittent, is required for its development.

Varieties.—The following well-marked and distinct forms may be mentioned: the *comatose variety* which is characterized by a tendency to coma; the *delirious variety*, characterized by a tendency to delirium; the *choleraic variety*, characterized by vomiting and purging with choleraic symptoms; the *algid variety*, characterized by marble-like coldness of the cutaneous surface; the *colliquative*, characterized by profuse sweating; and the *icteric* which is characterized by acute jaundice.

Clinical History.—Pernicious fever may begin abruptly, but generally its prodromes do not differ from those of the other malarial fevers. In the majority of the varieties the attack commences with a severe and prolonged chill. The paroxysm at this time may assume the form of either an intermittent or a remittent fever. One or two malarial paroxysms of the intermittent or remittent forms usually occur before the pernicious character of the fever appears. The type may be quotidian, tertian or quartan. Pernicious symptoms usually manifest themselves during the second or third paroxysm. In the quotidian type the pernicious attack occurs after the second or third day. In the tertian type it may not appear until the second week. A mild form of malarial fever may pass into a pernicious fever, by a progressive aggravation of symptoms; or a single paroxysm of not unusual severity may suddenly be followed by a pernicious one, terminating fatally with the second or third repetition. A numbness or coldness of the toes and fingers, continuing through the hot stage, while the trunk and head are in high fever heat is considered a characteristic sign of malignant remittent. At times a distinct initial chill may be followed by a condition clearly recognizable as one of the varieties of pernicious fever. One of the most common forms is the

Comatose Variety.—The only suggestive symptom of its appearance is the presence of more headache, vertigo, apathy and

disturbance of speech during either an intermittent or a remittent paroxysm, than ordinarily occurs in a simple form of malarial fever. After the chilly stage, and during either the hot stage of an intermittent or the exacerbation of a remittent, the patient passes into a state of stupor and unconsciousness. He lies upon his back. The eyes are closed and the pupils dilated. The face is hot and flushed. The skin is hot, dry, and jaundiced. The respirations are stertorous. The pulse may be either slow or frequent. The temperature reaches 105° Fahr. or 107° Fahr. If the case is to terminate fatally in this paroxysm the symptoms of coma continue deeper, unconsciousness becomes complete, the heart power weakens, the pulse becomes irregular, and the patient dies. Usually, however, after the comatose symptoms have continued for ten or twelve hours the patient returns to consciousness in the midst of a profuse sweat. The headache and vertigo now disappear, and according to the type there may be a well-marked remission or a distinct intermission. At this stage the case may recover. But frequently with the next remittent exacerbation or the hot stage of an intermittent, all the symptoms return with increased severity, the stupor becomes more marked, and the patient passes into fatal coma. Even when the patient lingers beyond the second paroxysm, he is apt to succumb, apparently from cerebral compression.

Delirious Variety.—The delirious variety is of less frequent occurrence than the one we have just described. As the patient passes into the exacerbation of a remittent or the hot stage of an intermittent, active delirium appears. This delirium differs from the ordinary delirium of malarial fevers in that it is violent in character, and is preceded by intense headache, ringing in the ears, and great restlessness. The face is either flushed or pale and sunken. The eyes are glistening and the conjunctivæ injected. The pulse is full and hard, and the carotids beat violently. The skin is hot and dry. The temperature rarely falls below 105° Fahr. and often reaches 107° Fahr. or 108° Fahr. This condition may last for hours. Somewhat suddenly the patient sinks into collapse, or passes gradually into deep coma from which he never awakens. In favorable cases the delirium becomes less and less marked, profuse perspiration appears, and the patient falls into a prolonged sleep, from which he awakes to consciousness with headache and vertigo, but without the

slightest recollection of what has taken place. A third or fourth repetition of the paroxysm is apt to prove fatal. At times epileptiform convulsions or tetanic spasms accompany or take the place of the delirium.

Choleraic Variety.—In the choleraic variety, which is of frequent occurrence, the patient after passing into the hot stage of an intermittent, or the exacerbation of a remittent, is suddenly seized with choleraic symptoms. The vomiting is severe and yellowish in character, and the evacuations from the bowels are either watery and greenish, or resemble bloody water. The thirst is apt to be intense. There is a sense of weight and burning in the epigastrium accompanied with cramps in the calves of the legs, coldness of the skin and extreme restlessness. The pulse is almost imperceptible, and the respirations consist of a double inspiration followed by a double sighing expiration. Occasionally there is great dyspnoea, caused by overwhelming congestion of the lungs. As death approaches the pulse becomes hurried, irregular and fluttering. The expirations become more and more prolonged and sighing, and the skin becomes bathed in a cold, clammy perspiration. The duration of a fatal paroxysm is from three to six hours.

Algid Variety.—The algid variety is as a rule confined to warm climates. It resembles somewhat the choleraic variety, and its progress is very insidious. It is characterized by marble-like coldness of the body. As the patient enters the exacerbation of a remittent or the hot stage of an intermittent, and notwithstanding he complains of burning heat and intense thirst, the surface of the body grows cold. The skin becomes pale and livid, and is covered with a cold sweat. The temperature in the axilla may be two or three degrees below the natural standard. The pulse is irregular, small and thready, and the respiration is superficial and slow; the breath is cold, and the voice is hoarse and feeble. The tongue is pale and cold, and the epigastric region is sensitive to pressure; muco-bilious vomiting is a not uncommon symptom. The urine is scanty, dark-colored and of high specific gravity. The patient is conscious but apathetic, and wears the countenance of death. Usually the paroxysm marches steadily on, till death closes the scene. If recovery is to take place, the pulse returns in the wrist, the warmth comes to the

surface, and the patient enters upon a slow convalescence. * Not unfrequently a typhoid condition like that after cholera, supervenes.

Colliquative Variety.—In the colliquative variety a continuous sweat sets in at the close of the hot stage, accompanied by great prostration and coldness of the surface. This variety tends to end fatally after the second or third paroxysm. In such cases the pallor of the skin and mucous membrane becomes strongly marked; the heart's action grows more and more feeble; the respiration becomes labored, and the patient sweats to death.

Icteric Variety.—The icteric variety is generally endemic, and is oftener engrafted on an intermittent. It begins with a long-continued chill, attended with jaundice. The jaundice rapidly deepens and the whole body assumes a saffron hue. Early in the attack there is intense nausea, with bilious vomiting and diarrhea; there is intense headache, and a feeling of numbness in the limbs; the tongue is coated white or yellow, and the thirst is excessive; there is pain in the region of the liver and spleen; the pulse is small, frequent and hard; the urine is scanty and presents a deep red color. At the appearance of the hot stage all the symptoms grow more intense; the pulse becomes more frequent; the respirations become labored; the skin is hot, and the thirst intense; the temperature reaches 106° Fahr., or 107° Fahr.; the vomiting and diarrhea continue, and the urine becomes more and more scanty, and tenesmus appears. This stage lasts from three to five hours, and may terminate in death. If a fatal termination does not take place at this point, the patient passes into the sweating stage. The skin is now bathed in a profuse sweat, and under proper treatment the patient enters upon convalescence. In relapses, death generally follows in the second or third paroxysm.

ANALYSIS OF CHART.

The Nervous System.—More or less complete coma characterizes the comatose variety. It sets in at the onset of the hot stage and may continue for a considerable time. Severe headache and vertigo are early symptoms of the delirious and icteric varieties. The delirium in the delirious variety varies from that of the lightest grade to the most violent maniacal spells. Eclampsia occurs mostly among children and puerperal women.

CHART IV.—*Pernicious Fever.*

The Bacillus Malarie.									
Etiology:		Intense headache and vertigo. Numbness and coldness of the toes during hot stage. During the exacerbation of a remittent or the hot stage of an intermittent.							
Prenominatory Signs:									
Varieties:		Comatose,	Delirious,	Choleraic,	Algid,	Colligative,	Icteric.		
Nervous system:		Early stupor,	Active delirium,	Restlessness,	Unconscious,	Restlessness,	Intense headache.		
Face:		Flushed,	Flushed,	Pale,	Pale,	Pale,	Yellow.		
Eyes:		Closed,	Glistening,	Sunken,	Sunken,	Sunken,	Jaundiced.		
Skin:		Hot and dry,	Hot and dry,	Cold and clammy,	Marble-like coldness,	Profuse sweat,	Early jaundice.		
Stomach:		Tenderness,	Tenderness,	Yellow vomiting,	Muco-bilious vomiting,	Tenderness,	Intense nausea.		
Bowels:		Constipated,	Constipated,	Greenish or bloody diarrhea.	Greenish-yellow stools,		Bilious vomiting.		
Extremities:		Paresis,		Cramps in the calves of the legs,	Cold,	Cold and clammy,	Bilious diarrhea.		
Temperature:		105° to 107°,	107° to 108°,		80° to 103°,		106° to 107°.		
Pulse:		Slow or frequent,	Full and hard,	Almost imperceptible.	Irregular and thready,	Feeble,	Frequent and small.		
Respiration:		Labored,	Labored,	Double sighing,	Cold breath,	Labored,	Labored.		
Relative frequency:		More frequent,	Less frequent,	Most frequent,	Mostly in warm climates,	Less frequent,	Less frequent.		
Termination:		Fatal in second paroxysm,	Fatal in third or fourth paroxysm.	Fatal often in from three to six hours.	Often fatal in first paroxysm,	Fatal in second or third paroxysm,	Usually recovers. May be fatal in 2d or 3d paroxysm		
Geographical limits:		The Southern and Southwestern States.				Equatorial regions generally.			

Hydrophobic symptoms too, sometimes occur in the delirious variety in women. Convulsions frequently complicate the choleraic variety. In convalescence from the latter variety there is frequently wakefulness, with irritability of temper and partial loss of memory. The headache in the icteric variety is intense, and increases as the attack progresses. In unfavorable icteric cases the patient passes into a state of coma and dies.

The Cutaneous Surface.—The skin is hot and dry, and the face flushed, in the comatose and delirious varieties; it is hot, dry, and intensely jaundiced in the icteric; and it is generally pale, cold and clammy in the choleraic; in the algid it is pale and livid, and has a marble-like coldness; in the colliquative it is covered with a profuse and frequently cold sweat.

The Alimentary Tract.—The tongue is dry and often covered with a fuliginous coat in the comatose variety. Thirst is great in all varieties. In the choleraic variety the symptoms resemble those of cholera; vomiting is yellowish in character in the choleraic form, and is attended with burping thirst. In the algid variety the vomiting is muco-bilious in appearance, and in the icteric, decidedly bilious. In the choleraic and icteric varieties the intestinal symptoms are of decided importance, but in the algid they are only subordinate. Serious hemorrhages from the stomach and bowels sometimes occur, and are apt to endanger the life of the patient. Dysenteric symptoms at times appear suddenly during a febrile attack, associated with cerebral manifestations.

The Circulatory and Respiratory Systems.—In the comatose variety the pulse is sometimes fast and sometimes slow; and the respirations are rapid and stertorous. In the delirious variety the pulse is full and hard; when tetanic spasms occur it is irregular. In the choleraic form the pulse is small and hardly perceptible early in the attack, and irregular and thready towards the close. The respirations are shallow and as slow as ten per minute. As death approaches the pulse and respiration come to a complete stand-still.

The Temperature.—In the comatose, delirious and icteric forms the thermometer usually shows a temperature of from 105° Fahr. to 108° Fahr. In the algid variety the temperature is oftener below than above the natural standard; while in the

choleraic and colliquative varieties it remains at a variable point above the normal until near the close of life.

Morbid Anatomy.—The anatomical lesions of pernicious fever differ in degree, but are similar in kind to those which take place in intermittents and remittents. Free pigment and bacilli (Fig. 9) are found in the blood in larger quantities than in any of the other malarial fevers. The white corpuscles are diminished to one-half or one-third their normal number. And secondary congestion of the abdominal viscera is a decidedly prominent autopsic phenomenon.

Differential Diagnosis.—In the diagnosis of pernicious fever the character of the prevailing fever is of great importance. For when the pernicious form is prevailing in a locality the diagnosis can easily be made; while in other cases, differentiation will be easy or difficult according to the type of fever. From simple intermittent or simple remittent, it can readily be distinguished after the first paroxysm, by the intensity of the symptoms and the general prostration.

From *apoplexy* it can be diagnosed by remembering that hemiplegia, which is a constant and prominent symptom of the former, is of rare occurrence in the latter. The coma and hemiplegia of pernicious fever, when present, are usually preceded by intense febrile excitement, while in apoplexy their onset is sudden and without fever.

From *meningitis* it may be diagnosed by the history of the case, and the sudden appearance of the coma. In meningitis, several days elapse before the delirium passes into coma. In pernicious fever one or two malarial paroxysms usually precede the attack of coma or delirium. In meningitis the pupil is dilated during the coma, while in the comatose variety of pernicious fever, it may be contracted, dilated, or normal.

From *cholera* the choleraic and algid forms may be distinguished by the early history of the endemic, the elevated temperature, and the character of the primary discharges. The choleraic discharges of pernicious fever are not profuse, and are characteristically preceded by one or two bloody discharges. The urine of cholera contains albumen, while that of pernicious fever does not; and finally, the blood of pernicious fever will be found to contain pigment, while that of cholera will not.

From *yellow fever* the icteric variety may be distinguished by the history of its development, and by the fact that when endemic it rarely troubles new-comers, but attacks those who have been for some time resident in the neighborhood. Yellow fever attacks by preference those who have recently moved into the infected district. The jaundice of pernicious fever appears earlier in the disease than that of yellow fever. Bloody urine; which is pathognomonic of the icteric variety of pernicious fever, rarely occurs in yellow fever.

Prognosis.—The prognosis is, as a rule, unfavorable, for unless the disease is controlled before the second or third attack, the case is apt to terminate fatally. Under appropriate treatment, however, statistics show that not more than from twelve to fifteen per cent. die. In all cases much will depend upon the character and stage of the epidemic. The ratio of mortality is invariably greater at the beginning than at the close of the epidemic. The prognosis is always unfavorable when the paroxysms increase in severity and duration; the patient is apt to die in the third or fourth paroxysm. Distinct intermissions, however short, render the prognosis less grave. The tertian type of fever is the most favorable. Severe dysentery coming on at the end of a paroxysm is an unfavorable sign; and generally when the second or third paroxysm is protracted, and has such ominous accompaniments as extreme restlessness and anxiety; epistaxis; delirium or coma; intense epigastric pain; numbness; red, scanty urine; vomiting and diarrhea; exhausting sweats, or feeble and almost imperceptible pulse; the prognosis is very unfavorable, and the patient may die, not later than the fourth or fifth paroxysm. Occasionally, as a paroxysm subsides, a continued fever with typhoid symptoms appears, and runs its course in ten or twelve days, terminating fatally.

The most fatal cases of pernicious fever are the choleraic and the algid. The most likely to recover are the comatose, the delirious and the icteric. The death-rate is greatest among the intemperate, and at the extremes of life.

Treatment.—The treatment of pernicious fever must of necessity be prompt, vigorous, and well-timed, for often the issue of life or death hangs on a single hour. Frequently, early in the disease the usual avenues for the introduction of remedies

into the system are closed, as the patient is either unable to swallow or the stomach rejects everything as soon as taken. In such cases the hypodermatic administration of our remedies becomes an imperative necessity. And in general, the immediate therapeutical effect of administering remedies in this manner is greater than by the usual *per os* method of administration.

Hypodermatic Medication.—Five drops of the desired attenuation of the indicated remedy mixed with five drops of water, may be introduced beneath the skin into the subcutaneous cellular tissue, with the hypodermatic syringe. The silver or German silver syringe is the best, and preference should be given to a needle made of gold with a hardened or iridium point. The syringe may be charged with the required dose of solution by drawing the fluid up into the barrel by aspiration. Should air enter while the fluid is being drawn up, invert the syringe and push up the piston slowly until all air is expelled. From five to twenty minims of solution is the quantity usually administered at each hypodermatic injection. The spot commonly selected for the injection is the arm about the insertion of the deltoid. Care must always be taken to avoid puncturing a vein. Where a patient is very timid or intolerant of pain, the sensibility of the skin may be lowered by applying a piece of cotton or cloth moistened with chloroform to the surface, and allowing it to remain a few minutes. Preparatory to making the injection take up a loose fold of skin between the thumb and index finger of the left hand; then push the needle in with a quick and decided motion, at a right angle to the fold. As soon as the needle penetrates the skin all resistance to its further progress ceases. Pass the needle along in the subcutaneous tissue under the skin for from three-fourths of an inch to one inch. Make the injection of the contained liquid slowly and finally withdraw the needle slowly, using pressure with the finger at point of puncture to prevent any escape of the solution.

The various solutions of quinine when subcutaneously injected frequently excite considerable burning, and a zone of more or less redness for some distance around the puncture. This irritation can be readily allayed by applying a wet compress to the part for a short time.

This method of medication inaugurated by Wood, of Edin-

burgh, and introduced into this country by Dr. Fordyce Barker, of New York, in 1856, is, I am positive, destined to inaugurate a new era in the method of administration of homœopathic remedies in sudden and dangerous types of disease, and perhaps also in chronic ailments.

Principal Remedies.—*Gelsemium*, etc.—Early in pernicious malarial fever, and before the pernicious character of the attack has been definitely stamped, *gelsemium*, or—according to the indications—one of the remedies mentioned in a former lecture on the treatment of simple intermittent fever, will be indicated.

Quinæ bi-sulphas.—As soon, however, as the pernicious character of the paroxysm becomes apparent, and without regard to the stage of the paroxysm, administer either the acid or the neutral sulphate of quinine (which is soluble in water) hypodermatically, in from one to two-grain doses every hour, until the time for the next paroxysm is passed. By so doing you will be very apt to prevent a return of the febrile movement, and thus save the life of your patient. Quinine, as a rule, in such cases, acts simply to prevent a recurrence of the much-dreaded paroxysm, and hence whatever organic changes are produced by a long-continued action of the malarial poison, must be corrected by appropriate treatment subsequently, before the patient can be pronounced cured.

As intercurrent and exceptionally as substitutive remedies, the following may be epitomized for further study:

1. *Comatose Variety*.—Opium or rhus tox.
2. *Delirious Variety*.—Hyoscyamus or belladonna.
3. *Choleraic Variety*.—Ars. alb., verat. alb., podophyllum.
4. *Algid Variety*.—Camphor, carbo veg., menyantes, verat. alb.
5. *Colliquative Variety*.—Cinchona, jaborandi, phosphorus.
6. *Icteric Variety*.—Crotalus, eupat. perf., bryonia.

The prophylactic and hygienic treatment is the same as for simple intermittent fever. Externally, direct heat may be applied with hot-water bottles or hot sand bags laid along the spine. Stimulating enemas, and friction to the surface may also act as aids. In collapse a tablespoonful of brandy or whisky may be given every half hour or hour, until reaction occurs. As regards the use of stimulants at other times, the condition of the patient must be your guide.

LECTURE VII.

Chronic Malarial Infection.

Before leaving the diseases caused by that malarial poison, the bacillus malariae, I must say something about CHRONIC MALARIAL INFECTION or MALARIAL CACHEXIA.

Definition.—Chronic malarial infection, though a frequent sequel of acute malarial disease, may exist as a primary affection in intensely malarial regions, without any antecedent attacks of malarial fever. To illustrate: one individual may after frequent repetitions of, or incomplete recovery from intermittent or remittent fever, become anæmic, show on physical examination enlargement of the liver and spleen, and otherwise present the peculiar phenomena of chronic malarial infection; while another individual, after living for some time under malarial influence may present the same phenomena of chronic malarial infection, the anæmia, and the enlarged liver and spleen, though he may never have had a distinct paroxysm of malarial fever.

Synonym.—Malarial Cachexia.

Etiology.—Its etiology is the same as of malarial fevers in general. It may result from either a long-continued exposure in a slightly malarial district, or a short exposure in a strongly malarial region. The excessive use of quinine predisposes to malarial cachexia.

Clinical History.—Patients suffering from chronic malarial infection generally complain of vertigo, with ringing in the ears, and disturbances of vision. They perspire copiously at night and on the slightest exertion. Pain and oppression at the epi-

gastrium is a frequent symptom. The tongue is covered with a yellowish-white coat; the mouth is dry and the taste metallic. There are nausea, anorexia, and frequently morning diarrhea. The sleep is usually disturbed; or if profound is unrefreshing.

Many complain of wandering, dragging or burning pains in the back, along the sciatic nerve, and over the coccyx. The latter region is frequently painful on pressure. Others have stiffness of the muscles of the limbs and back, and suffer from fatigue and palpitation of the heart, on the slightest exertion. Anæsthesia of the outer surfaces of the thighs, numbness of the arms, and burning of the feet are quite common symptoms. While hemiplegia and neuralgia—especially of the fifth nerve—are among the occasional nervous manifestations. Patients suffering from long-continued malarial poisoning are very apt to become the victims of melancholia and hypochondriasis. The skin presents a yellowish pale hue. The urine is generally about normal, though at times it is profuse, and of low specific gravity. In severe attacks it may be scanty and dark colored. The temperature and pulse are usually normal, though the latter may be variable. The liver and spleen are enlarged, hard, and sensitive to pressure. In prolonged and severe cases, ascites is developed, hemorrhage from the nose occurs, and furuncles appear on the cutaneous surface.

Morbid Anatomy.—The anatomical changes which take place in malarial cachexia resemble those of the severer types of malarial fever. The spleen is oftentimes enormously enlarged, and presents the changes of either simple hyperplasia or amyloid degeneration. Its surface is uneven, the capsule much thickened, and its substance proper is very rich in pigment matter. Similar changes take place in the liver; and the kidneys are sometimes extremely hyperæmic. Amyloid and fatty degeneration occasionally appears in the muscular tissue of the heart. The skin is always anæmic, and frequently there is œdema of the subcutaneous cellular tissue. An accumulation of fluid in the serous cavities often co-exists. Pigment granules and vacuolated red corpuscles are found in great numbers in the blood. In profound anæmia the number of red corpuscles may fall from five millions to less than one and one half millions per cubic millimeter of blood.

Differential Diagnosis.—The main characteristics of chronic malarial infection are: enlargement of the liver and spleen; a paroxysmal disposition in all the manifestations; the presence of free pigment in the blood in severe cases; vertigo with ringing in the ears; a disposition to catarrhal inflammation of the gastro-intestinal and respiratory tracts; a tendency to melancholy and hypochondriasis; attacks of neuralgia; anæmia, with palpitation of the heart; anasarca and general dropsy.

And the occurrence of such a chain of symptoms in an individual who has repeatedly suffered from malarial fever paroxysms, or has resided in a malarial district even though he may not have had a distinct malarial paroxysm, or who has been drugged or overdosed with quinine, is sufficiently suggestive of malarial cachexia.

Prognosis.—As regards the prognosis we may say that the milder grades usually recover under appropriate treatment, while in the severe forms death may result from exhaustion with dropsical symptoms, Bright's disease, lung affections, or from apoplexy due to pigment embolism. And generally, the greater the area of splenic and hepatic dullness the more unfavorable the prognosis.

Treatment.—The patient must be immediately removed from the malarious district to an elevated, warm and mountainous region. He must avoid getting wet, and must also observe all the hygienic regulations mentioned in the lecture on intermittent fever. The diet must be most nutritious, and should include a moderate allowance of light wines. Shower baths, and frequent cool baths with douches to the region of the liver and spleen, are very effective measures.

Principal Remedies.—*Arsenicum Alb.* is the main remedy for chronic malarial infection, especially when quinine has been used to excess. It is particularly indicated when there is a tendency either to Bright's disease or phthisis. The guiding symptoms are: anæmia, with great debility, and oppression of breathing. Occasional symptoms are: spasms in the chest, violent pains in the stomach, and a left sided neuralgia associated with hemiplegia, also left sided. A decidedly dropsical tendency is always a strong indication for arsenic.

Ferrum.—Is adapted to cases where the anæmia is great and the debility extreme, provided œdema has not yet appeared. The stomach rejects all food, and there is palpitation of the heart. The breathing is difficult, and there is oppression of the chest as if some one pressed with the hand upon it. Particularly useful in weak, nervous individuals, and in delicate chlorotic women.

Natrum Mur.—Is useful when the digestive organs are affected, and there is deficient nutrition. There is great emaciation and great prostration. The pulse is intermittent. The skin is dry and sallow. The urine is light and watery. And the patient is depressed, sad and melancholic.

Lycopodium.—Is indicated when the digestive disturbances are due to hepatic influences, and when there is chronic gastrointestinal catarrh. The face has a yellowish gray appearance. The hepatic region is sensitive to pressure. The smallest quantity of food produces satiety. Excessive fullness and distension of the abdomen from flatulence co-exists.

Calcarea Carb.—Is useful in scrofulous individuals when there is a tendency to glandular swellings. The spleen is enlarged. The patient is unable to walk, perspires and has palpitation of the heart on the slightest exertion. The stools are white and undigested. At times there is alternate constipation and diarrhea.

Finally, sulphur, carbo veg., merc. bi-jod., phos., or some intercurrent remedy, will be needed to meet the various complications that may occasionally arise.

Dengue.

I now come to the consideration of a fever, which, though not strictly malarial in character, has a right to be classed among miasmatic or infectious fevers. It is DENGUE FEVER (pronounced *dangay*.)

Definition.—Dengue is an acute febrile affection of short duration which appears as an epidemic in hot climates. It is due to an unknown external specific cause, and is characterized by two distinct and essentially different febrile paroxysms separated by a remission. It is accompanied by more or less intense arthritic pains, and occasionally by a cutaneous efflorescence re-

sembling that of scarlet fever. Dengue attacks all ages, and both sexes, and is an extremely painful disease. It may relapse, but seldom proves fatal.

Synonyms.—Break-bone fever, dandy fever, three-day fever, stiff-necked fever, date fever, polka fever.

History.—The earliest account of dengue fever, according to de Wilde dates from the year 1779. David Brylon, of Java, at that time described under the name *knockel koorts* (bone fever) an epidemic disease which prevailed in Batavia. The following year Dr. Rush described an epidemic which occurred in Philadelphia. In 1818 the disease appeared at Lima, and in 1826 at Savannah. A general epidemic started at St. Thomas in the West Indies, in 1827, and spread to this country in 1828, where it appeared at Pensacola, New Orleans, New York, Philadelphia and in some other cities. An epidemic prevailed in Brazil, in 1846. In 1848, the fever again appeared, along with yellow fever, in New Orleans, Vicksburg and Mobile. Two years later a general epidemic starting in Charleston, traversed the entire Southern States. In 1852, it appeared in Peru and was followed by yellow fever. For four consecutive years following 1864 it prevailed in Spain. It visited Arabia in 1871, and starting at Bombay and Cananore the next year, it spread through all India. In 1880 a mild epidemic prevailed at Charleston and in several of the Gulf cities.

Etiology.—Dengue is a disease of warm climates, and promptly disappears upon the advent of frost. It prevails chiefly in cities, and travels mainly in the direction of the lines of human intercourse. The nature of the exciting cause of this disease is at present unknown. The morbid agent is, however, generally believed to be specific in character; and the infection is capable of being conveyed in clothing and merchandise from one part of the country to another. The period of incubation of the germ is from three to five days. Dengue is usually regarded as non-contagious.

Clinical History.—The initiatory symptoms usually appear suddenly. Sometimes there is a prodromal stage of from one to three days' duration, characterized by slight chills, headache, a furred tongue, loss of appetite, and pains in the back and along the spine. In the majority of cases the patient is seized with

intense frontal headache, photophobia, backache, and severe pain in the joints. Occasionally the first symptom is an acute pain in one of the small joints. The joints now swell rapidly and a painful stiffness of the muscles appears. The skin of the face and neck becomes flushed and turgid. The temperature may reach 107° Fahr. The pulse is full, hard and strong, occasionally intermittent, and ranging from 120 to 140 beats per minute. The stomach is extremely irritable, and there is burning pain in the epigastrium with nausea, and bilious vomiting. The lymphatic glands, beginning with the inguinal, frequently become enlarged and tender, and the epididymis is much swollen. A primary exanthem resembling the efflorescence of scarlet fever, but of a duller hue, and lasting only during the continuance of the fever now shows itself. This constitutes the stage of *invasion*.

In from twelve hours to two, three or five days, the fever suddenly abates—frequently with the occurrence of critical symptoms such as profuse sweats, greenish, foul-smelling diarrhea or epistaxis—leaving the patient feeble and prostrate. As the fever subsides the eruption disappears, the pains in the muscles and joints abate and moisture appears on the skin. The duration of this stage—the stage of *remission*—is from two to three days; occasionally it is so short as to be overlooked.

The *exacerbation*, or second febrile paroxysm occurs on the fifth or sixth day of the disease. Its onset is announced by the re-appearance of the acute symptoms. The temperature again rises, but the fever is remittent rather than continued in character. Simultaneously with the elevation of temperature, a scarlatinal, erythematous, or roseola-like eruption makes its appearance. This exanthem shows itself first upon the palms of the hands or upon the soles of the feet, and soon spreads over the entire body. It is attended by a troublesome itching, and after remaining from a few hours to two or three days, vanishes in a furfuraceous desquamation. The fever now gradually subsides, and the acute symptoms disappear, and the patient passes on to convalescence.

Duration.—Dengue is a self-limited affection, appears frequently in distinct types, and has an average duration of about eight days. Relapses after an interval of two or three weeks frequently occur. These are always milder than the primary at-

tack, and closely resemble an attack of articular rheumatism. Complications seldom arise, and sequels are rare. Dr. Forrest, of Charleston, mentions excessive and obstinate prostration, sleeplessness, anæmia, neuralgia, boils and carbuncles, aphonia, bronchial catarrh, rheumatism, and temporary paralysis of the lower limbs, as possible sequels.

ANALYSIS OF CHART.

The Nervous System.—The headache, during the fever especially, involves the forehead and temples. Restlessness and sleeplessness are generally present during the first and third stages. Sometimes nocturnal delirium occurs. In children convulsions are prone to appear, and occasionally cause a fatal termination.

The Cutaneous System.—In the majority of cases a *primary* and a *secondary* exanthem occurs. The primary exanthem is not as constant a manifestation as is the secondary exanthem. When present it appears and disappears simultaneously with the fever. The secondary exanthem is as a rule always encountered. It may assume various and occasionally mixed forms. In children, blotches resembling urticaria are frequently seen, and at times considerable swelling of the skin attends the eruption. As the fever subsides bran-like desquamation usually takes place. In exceptional cases the desquamation may be flaky instead of furfuraceous. In very rare cases the mucous membrane of the throat, mouth, and nose becomes inflamed and ulcerated. During convalescence, boils and extensive subcutaneous abscesses occasionally occur.

The Glandular System.—The parotids are frequently swollen, and the glands about the groin and axilla become transiently enlarged. In severe cases along with enlargement of the epididymis, serous effusion may take place into the tunica vaginalis.

The Digestive System.—Thirst and anorexia accompany the whole course of the disease. The taste is disordered and the tongue becomes coated with a white or greenish-yellow fur. The patient complains of nausea with pain in the epigastrium, and occasionally vomiting. In the early stages there is constipation with a tendency to hepatic torpor or slight congestion. Later in

CHART V.—*Dengue.*

Duration:	Eight days.		
Initial symptoms:	Intense headache.	Acute pain in small joints.	
STAGES:	Invasion,	Remission,	Exacerbation.
Time:	2 to 3 days,	12 hours to 3 days	2 to 3 days.
Nervous system:	Intense frontal headache Sleeplessness.	Partial subsidence of all symptoms. Critical discharges.	Headache. Extreme nervousness.
Eyes:	Staring expression. Photophobia.		Conjunctivitis. Photophobia.
Temperature:	106° to 108°,		105° to 107°.
Pulse:	120 to 140,		120 to 140.
Respiration:	28 to 30 per minute,		23 to 26 per minute.
Eruption:	Primary exanthem, scarlatinal.		Secondary exanthem, scarlatinal, erythematous or roseola-like, Branny desquamation.
Glands:	Glandular swellings, especially of inguinal glands, and epididymis,		Glandular swellings. Boils.
Extremities:	Boring pain, and stiffness in joints and limbs,		Pains and stiffness, Loss of strength in legs.
Tongue:	Coated, silver-white or greenish-yellow,		Thickly coated.
Stomach:	Thirst. Nausea. Billous vomiting.		Nausea. Rarely vomiting.
Bowels:	Constipated,		Frequently diarrhea.
Urine:	Scanty and dark, sp. gr. high,	Augment'd.	Scanty and dark.
Prognosis:	Always favorable.		
Convalescence:	Frequently protracted, with extreme debility, stiffness and soreness of the joints, and great emaciation.		
Duration of epidemic:	From two to seven months.		

the disease the constipation may disappear, after a crisis marked by diarrhea.

The Extremities.—The affection of the joints and limbs attacks large and small joints alike. The joints of the hand, foot and knee are first attacked, then the spine, and lastly the joints

of the elbow and shoulder. In severe cases all the joints become involved. The peculiarities of gait and attitude caused by interference with the natural movements of the limbs have given to this disease many of its synonyms. The affected joints are swollen, red, immobile, painful and highly sensitive to the touch. The muscles are stiffened and sore, and the tendons are somewhat swollen. The pains are characterized as rheumatic or rheumatoid, and tend to pass from one joint to another with great rapidity.

After the second paroxysm the joint disturbance gradually disappears. Ofttimes it lingers for several weeks and may become localized. Extreme debility and loss of muscular power, more particularly in the legs, may continue far into the convalescence.

Differential Diagnosis.—In the first paroxysm, or stage of invasion, this fever may be confounded with acute articular rheumatism. In the second paroxysm, or stage of exacerbation, it bears a striking likeness to scarlet fever or measles. In its general course it strongly resembles spirillum or relapsing fever. From rheumatism it may be distinguished by the cutaneous eruption and the epidemic character and rapid spread of the disease. From scarlet fever it may be distinguished by the persistency of the rheumatic and neuralgic pains, as well as by the natural course of the affection. And from relapsing fever it may be differentiated by the eruption, the character of the remissions, and the absence of spirilla in the blood.

Prognosis.—The prognosis is always very favorable. A fatal termination is an exceptional occurrence, and appears mostly at the extremes of life.

Treatment.—*Prophylaxis.*—Rigid quarantine of infected districts and the complete isolation of patients are absolutely necessary to prevent the rapid spread of dengue.

Diet.—The diet should be most nutritious, and frequent feeding will prove very beneficial. Hot drinks during the fever are grateful to the patient and tend to excite free perspiration, a state greatly to be desired. During convalescence alcoholic stimulants should be given.

Principal Remedies.—In the first stage, *aconite* either alone or in alternation with *belladonna* or *bryonia* has been found

most beneficial. In the second stage, *arsenicum alb.*, *bryonia*, *rhus ven.*, *nux vom.*, *puls.*, or *sulphur* will be most frequently indicated. In the third stage, *gelsemium* takes the place filled by *aconite* in the first stage. During convalescence either *cinchona* or *nux vom.* may be needed. Hot mustard foot-baths at the onset of the fever, are highly recommended. The annoying itching which attends desquamation at the close of the second paroxysm may be relieved by the application of a one per cent. solution of carbolic acid, while the stiffness and soreness of the muscles and joints which tend to linger and thus protract convalescence, will be best treated by either massage or the mild galvanic current.

Leading Indications—Aconite.—In the first paroxysm when there is high fever, great restlessness and anxiety, full, hard, quick pulse; pain in the forehead and temples; hot, pale-red swelling of the joints. It is followed well by *belladonna*.

Belladonna.—Especially adapted to dengue in children, and when either the congestive or throat symptoms predominate. Eyes are red and glistening; staring pupils. Red, shining swelling of the joints. Pains running from the affected joints along the limbs like electric shocks.

Bryonia.—Neuralgic and rheumatic pains, worse on motion. Faintish streaky redness of the joints. Pain in the eyes when moving them. Loss of appetite, white coated tongue, fullness and oppression in the pit of the stomach and bowels.

Eupatorium perf.—Has been highly recommended in the first stage. The bones ache as if broken. Painful soreness of both wrists as if broken. The tongue is thickly coated yellow, and there is thirst with vomiting after drinking. The region of the liver is sore on pressure, and there is great tenderness in the epigastrium.

Gelsemium.—In the stage of exacerbation, and in asthenic types of the fever generally. There is intense muscular prostration. Great languor and drowsiness. Heavy suffused eyes, and an eruption resembling measles. Giddiness with loss of sight. Bruised pains in the muscles, general rheumatic symptoms. The tongue is coated whitish or yellowish, and there is a sticky feeling in the mouth.

Hyoscyamus.—For the extreme nervousness and sleeplessness.

Mercurius.—Is occasionally indicated when there is swelling of the glands of the neck. The pains in the joints are tearing, worse at night and in warmth of the bed. Diarrhea especially toward evening.

Pulsatilla.—Is often indicated during the remission, and when the pains are relieved by a critical discharge. The pains are of a drawing, tearing character and frequently shift from one part to another. All symptoms are worse toward evening, and at night in a warm room; better from changing position and uncovering the affected parts. The tongue is moist and coated, and there is a bad taste in the mouth. Diarrheic stools at night. Urticaria. *Epididymitis*.

Rhus Venenata.—Is one of the most useful and oftenest indicated remedies, after aconite. The guiding symptoms are those of the skin and mucous membrane. There may be excessive parotid inflammation, especially on the left side. The axillary glands are inflamed and swollen. The eruption is dark-colored. There are drawing, tearing pains in the joints with a sense of lameness and formication in the affected parts. The pains are worse during rest and when commencing to move; they are relieved by continued motion and by dry external warmth. Jerking, tearing pains in the elbow and wrist joints. Paralysis of the lower extremities.

LECTURE VIII.

Typho-Malarial Fever.

We now come to the study of typho-malarial fever, a disease that has attracted much attention since the late civil war. Its relations are somewhat peculiar, in that it presents many elements in common with typhoid fever, and many which ally it to remittent fever.

Definition.—It is a miasmatic disease due to the combined action of a *malarial* and a *septic* poison, and may appear in two at times distinct, and at other times, imperceptibly blended types. The *first*, or *malarial type*, is ushered in by a distinct chill, and is characterized by a rapid rise of temperature, a tendency to tertian periodicity, predominance of gastric symptoms, abdominal tenderness and diarrhea, and the presence of free pigment in the blood; it usually terminates in recovery, amendment gradually taking place between the 10th and 20th days. The *second*, or *septic type*, is marked by a more decided typhoid tendency, more hepatic tenderness and splenic enlargement, an icteroid hue of the skin, dark foetid evacuations, more abdominal tenderness, and an increased amount of free pigment in the blood. In fatal cases, at the close of the second week, the patient passes into a state of stupor, followed by coma and death. In cases that are to recover, at the end of the second week the tongue begins to clean, and the gastric and intestinal symptoms gradually subside. Convalescence is slow and tedious. After death, pathological lesions are found, which closely resemble those of typhoid fever on the one hand, and remittent fever on the other. Typho-malarial fever is non-contagious.

Synonyms.—It has been variously termed entero-miasmatic fever, remitto-typhus, camp fever, and Chickahominy fever.

History.—Typho-malarial fever is most prevalent in malarial districts, and more especially during the autumnal season. It prevailed largely among the United States troops during the war of the rebellion, and was the great scourge of the army of the Potomac in the Peninsular campaign of 1862.

Etiology.—The true nature of the poison of typho-malarial fever is unknown. It is however generally believed to have a double origin; part of the morbid agent being supplied by malaria, and part by some other poison, septic in character, of which sewer-gas is the type. With such a dual character this morbid agent may give rise to two types of fever, according as one or the other element predominates. Hence we speak of a *septic* and of a *malarial* type of typho-malarial fever. Oftentimes the distinguishing lines between these two types are not sharply defined, and frequently the symptoms of the one become almost imperceptibly mingled with those of the other.

Typho-malarial fever is non-contagious. It is a disease solely of malarial districts, and prevails only when anti-hygienic conditions, such as over-crowding and bad sewerage exist to favor the development of the septic element.

Clinical History.—The clinical history embraces a description, first, of that type in which the malarial element prevails, and then of the form in which the septic element is predominant.

The Malarial Type.—The premonitory symptoms of this type, when present, are those of malaise, headache, loss of appetite, and wandering pains in the back and limbs. At this stage the countenance frequently presents a yellowish or clay-colored aspect.

The attack is usually ushered in by a distinct chill or general coldness, which bears a marked resemblance to the chill of simple remittent fever. Following the chill, which varies in duration from half an hour to an hour, active febrile symptoms appear, and the temperature rises in a few hours to 103° Fahr. or 104° Fahr. The excretions are all checked, and the skin becomes hot, dry and harsh. The pulse reaches 100 and is full and forcible.

The patient is restless, sleepless and incapable of mental exertion. Between sleeping and waking there may be slight delirium. The tongue is at first pale and flabby then moist and covered with a whitish yellow fur. After a time it becomes dry and red and sordes may collect upon the teeth and lips. As the fever advances, nausea, vomiting, and epigastric tenderness become more marked. In many instances diarrhea precedes the initial chill; in the majority of cases it is present during the fever. Early in the disease there is abdominal tenderness, especially in the right iliac fossa. A decided tendency to tertian periodicity exists throughout the entire course of the fever.

In fatal cases, as the patient enters the second week, or sometimes later, symptoms of the *typhoid state* appear; the prostration rapidly increases; the pulse becomes frequent and feeble; the patient passes into a state of stupor; the tongue becomes dry and fissured, and is protruded with difficulty; the feces and urine escape involuntarily, or the urine may be retained; and there may be subsultus tendinum and carphologia; gradually the stupor deepens into coma, and death takes place.

In favorable cases the symptoms begin to ameliorate between the tenth and twentieth days; the temperature steadily declines and the pulse becomes less frequent and fuller; the nervous symptoms improve; the tongue becomes clean, the thirst diminishes, and the appetite returns; the abdominal symptoms subside, and the patient enters upon a protracted convalescence.

The Septic Type.—The initial symptoms of this type are those of general malaise, with headache, and pains in the back and limbs. Usually the febrile symptoms are ushered in with either a distinct chill, or a complete intermittent or remittent paroxysm; following the chill, the temperature rise may be either sudden or gradual; it may reach 104° Fahr. or 105° Fahr. within twenty-four hours, or not until the eighth or tenth day. A tertian or quartan periodicity runs through the whole course of the disease. The pulse is full and frequent, and averages about 100 beats per minute during the early days of the fever; later, it becomes small and compressible and may range from 110 to 130 per minute. The headache becomes continuous, and as the fever progresses gives place to a muttering delirium; the sleep is much disturbed, and there is great lack of mental vigor; occasionally

subsultus tendinum, and *carphologia* appear. The skin becomes dry and assumes a bronzed or jaundiced hue. The lips are dry and parched. The tongue is at first, moist, swollen and covered with a whitish fur; after a time it becomes dry, cracked and fissured. The urine grows scanty and high-colored. The stools, which tend to increase in frequency as the disease advances, are fetid, watery, and generally dark-colored. The abdomen is rarely distended; frequently, it is somewhat retracted; it is tender to pressure, particularly over the ileo-cæcal region.

In fatal cases as the patient reaches the second or third week, the symptoms closely resemble those of fatal typhoid fever; the pulse now becomes irregular and feeble; the prostration steadily increases; the fæces and urine escape involuntarily or the urine is retained, and the patient passes into a state of stupor, which deepens into coma, and ends in death.

In favorable cases improvement sets in about the twelfth or fourteenth day; the tongue becomes moist and begins to clean, gradually, from the edges to the center. A renewal of the fever symptoms is sure to occur, when, after the coating is thrown off in flakes, the tongue assumes a beefy red appearance, and again becomes dry and brown. As recovery progresses, the abdominal symptoms, with the exception of the diarrhea begin to subside; the pulse becomes slower and the temperature range steadily approaches the normal; the appetite improves; the strength gradually returns; and the patient enters upon a tedious convalescence, liable to be disturbed by complications and sequels.

Typho-malarial fever, when occurring amongst the poorly fed and illy clad, who live in badly ventilated apartments, frequently takes on a low type and is attended by neuralgic and arthritic pains in various parts of the body, and at times displays a hemorrhagic tendency, marked by bleedings from the gums and mucous surfaces. In such cases death may be caused during the course of the disease by hemorrhage from the mucous surfaces; and even after convalescence appears to be established an uncontrollable diarrhea may set in, and by exhaustion lead to a fatal result.

Complications.—The most frequent complication of typho-malarial fever is inflammation of the respiratory organs; it may take the form of either a troublesome bronchitis, or a catarrhal

pneumonia. So often is it the complicating lesion, that whenever any sudden variation in temperature occurs during the course of the fever, lung trouble may be suspected, and a thorough physical exploration of the chest should be instituted. Serious abdominal complications, such as intestinal perforation, peritonitis and hemorrhage, are rarely met with in this fever.

Duration.—The average duration of typho-malarial fever is from three to four weeks. The malarial variety is always shorter than the septic. Relapses may occur at any period during convalescence.

ANALYSIS OF CHART.

The Nervous System.—Headache is one of the earlier and more constant symptoms. It often precedes the ushering-in chill. It is most severe in the first week, and passes into muttering delirium as the fever progresses. In many instances the delirium, if mild, occurs only at night, and in all cases it is more marked during the night time. In advanced stages of severe cases, subsultus terdinum, picking at the bed-clothes, and vague graspings in the air are observed. Neuralgic and arthritic pains in the back and limbs are commonly present in cases modified by anti-hygienic surroundings. With defervescence there is great lack of mental vigor, and a tendency to mental sluggishness.

The Digestive Tract.—The tongue at first is somewhat swollen, and covered with a thin, whitish fur. As the typhoid state increases, it becomes dry, brown, and fissured. In grave cases sordes collect upon the teeth and lips. The appetite is greatly disturbed from the start, and is wholly lost when the tongue becomes brown and dry. In mild cases when the tongue retains its moisture, the loss of appetite may be only partial. Nausea and vomiting, and epigastric tenderness are present in a greater or less degree in all cases. The matters vomited usually consist of food, or of gastric mucus stained green with bile. Diarrhea is a common symptom and may occur at any period. It is seldom excessive before the second or third week. The stools are generally fetid, watery, and dark-colored. At times they are of a dark clay color. With the diarrhea there is more or less abdominal tenderness, especially in the right iliac region. Tympanites is seldom marked. Hemorrhage from the bowels

CHART VI.—*Typho-Malarial Fever.*

Nature:	Non-contagious.		
Etiology:	A dual morbid agent—(septic and malarial.)		
Period:	First week,	Second week, (and exceptionally the third)	Third week, (and exceptionally the fourth.)
Initial symptoms:	A chill or malarial paroxysm.		
Nervous system:	Headache, Restlessness, Sleeplessness, Swollen.	Active or muttering delirium. Subultus tendinum. Carphologia,	Delirium disappears or passes into stupor and coma.
Tongue:	Red papillae White coating	Dry and brown,	Moist as convalescence sets in
Stomach:	Anorexia, Nausca. Vomiting.	Epigastric tenderness.	Subsidence of symptoms.
Bowels:	Fetid, watery, dark evacuations; at times constipation.		
Abdomen:	Slight tenderness in right iliac fossa. Retraction. Tympanites rare.		
Pulse:	100. Full and forcible,	110 to 130 Small, compressible,	Slower or faster,
Temperature:	Gradual or sud'n rise, 103° to 105°,	Remissions every 2d or 3d day,	Gradually approaches the normal.
Face:	Waxy, clay-colored or yellowish		
Skin:	Bronzed, or icteric hue.		
Blood:	Free pigment granules.		
Urine:	Scanty, dark-colored, turbid.		Increased.
Liver:	Enlarged. Hepatic tenderness		
Spleen:	Enlarged. Pigmented. Dark.		
Duration:	Two to four weeks.		
Complications:	Bronchitis and catarrhal pneumonia.		

occasionally occurs and may cause death from exhaustion. When diarrhea follows the subsidence of the fever, and is uncontrollable, there is danger of its leading to a fatal termination. Hepatic tenderness is a well-marked and early symptom. Enlargement of the spleen takes place as the fever progresses. The amount of enlargement is apt to be greater than in typhoid fever.

The Temperature.—The temperature rise is apt to be sudden, and may reach 103° Fahr. or 104° Fahr. in a few hours. In some cases the rise is gradual, the maximum not being reached before the tenth day. Well-marked forenoon remissions appear every second or third day.

The Pulse.—The increase in the frequency of the pulse corresponds to the rise in temperature. It is less frequent in the morning than in the evening. During the first week it is full, and rarely exceeds 100. During the second and third weeks, it is small and compressible, and ranges from 110 to 130. During the third week it gradually diminishes in frequency. In severe cases it is apt to be frequent. And as a general rule a steady range above 120 renders the prognosis somewhat unfavorable.

The Cutaneous Surface.—The skin becomes dry and harsh, and assumes a *bronzed hue* shortly after the onset of the fever.

Morbid Anatomy.—The pathological changes of typho-malarial fever are similar to those which occur in typhoid fever, and in malarial fever. The *liver* is increased in size, and its cut surface presents an appearance analogous to that of nutmeg liver. In many cases it is softened, and upon microscopical examination shows free fat, and more or less brown pigment in the hepatic cells. The *spleen* is enlarged, softened and pigmented, and on section is of an almost black color. The changes in the *kidneys* are those of hyperæmia and are most marked in the cortical substance. The *heart* is soft and of a pale, yellowish, or faded-leaf color; the softening is due to a granular degeneration of the muscular fibres. The *blood* is dark colored, and contains *free-pigment granules*. The *intestinal changes* of typho-malarial fever, like those of typhoid fever center in and around the agminate and solitary glands of the ileum. The pathological processes commence at the lower extremity of the ileum and extend upwards. The glands may be found in different stages of degeneration. In the earlier stages they are enlarged and infiltrated by an excessive proliferation of cellular elements, and by a deposit of black pigment, and the mucous membrane presents the appearance of catarrhal inflammation. Peyer's patches become thickened, and there is a gradual elevation of the mucous membrane surrounding the enlarged follicles. After a variable length of time, ulcers appear at the summit of the follicles.

These ulcers differ from those of typhoid fever, in that they present ragged, irregular and extremely undermined edges, and are more or less pigmented. They may involve only a single follicle, or they may extend into the submucous tissue and attain the size of from half an inch to an inch in diameter. The enlarged patches rarely present the umbilical depression prior to ulceration, so common in typhoid fever. Intestinal perforation as a result of ulceration is an accident seldom met with in typho-malarial fever. The mesenteric glands will usually be found more or less enlarged and pigmented. Small ulcers are occasionally met with in the stomach and large intestines. And if scurvy complicates either type, ulcerative changes similar to those found in chronic malarial dysentery, are liable to occur.

Differential Diagnosis.—The septic type of typho-malarial fever is liable to be confounded with *typhoid fever*, and the malarial type with simple remittent fever. The onset of typho-malarial fever however, is apt to be sudden and is marked by a distinct chill, while that of typhoid fever is insidious, and is attended only by a chilly sensation. The temperature rise in typho-malarial fever is sudden, and follows no typical range, while in typhoid fever the typical range during the first week is characteristic. In typho-malarial fever there is a distinct periodicity in febrile action which does not appear in typhoid fever. Typho-malarial fever has no characteristic eruption, while typhoid fever has a rose-colored eruption, which makes its appearance about the seventh day. The individual rose-colored spots of typhoid fever last only three days, while the eruption of typho-malarial fever, when present, remains visible throughout the whole course of the fever. In typho-malarial fever the skin has an icteroid hue, and there is marked hepatic tenderness, and extensive splenic enlargement. The stools of typho-malarial fever are non-infectious, while those of typhoid fever are infectious. The blood in typho-malarial fever contains free pigment, while that of typhoid fever rarely does.

From simple remittent fever, typho-malarial fever may be differentiated by the early appearance of the enteric symptoms in the latter.

From typhus fever, it may be diagnosed by the presence of

abdominal symptoms which are absent in typhus, and by the absence of the mulberry-rash of typhus.

From *yellow fever*, it may be distinguished by the fact that the range of temperature is lower in the former than in the latter. Yellow fever is a portable disease, typho-malarial fever is endemic, and non-portable. In yellow fever the short duration of the disease, the remission on the third or fourth day, the circum-orbital pain, the red and watery eye, the peculiar color of the skin, the projectile vomiting, the black vomit, the gaseous pulse, the absence of diarrhea, and the presence of albumen in the urine, are symptoms sufficiently diagnostic.

Prognosis.—The prognosis varies with the habits and social condition of the patient. The average ratio of mortality is from five to ten per cent. The septic type is more fatal than the malarial type. Drunkenness and anti-hygienic surroundings lessen the chances for recovery. The prognosis should always be guarded when there is a continued high temperature, a frequent, feeble, fluttering pulse, a profuse diarrhea, a dry, red and fissured tongue, great drowsiness and a tendency to stupor and coma, and especially when, during the third week of the fever, capillary bronchitis or pneumonia supervenes.

Treatment.—The preventive treatment consists in the first place in entire removal from anti-hygienic surroundings, such as over-crowding, defective sewerage or faulty drainage; and in the second place, in well regulated and nutritious feeding, and in the strict observance of the laws of health. You will frequently find *baptisia*, 1st dil. administered morning and evening, act as a valuable prophylactic in localities where typho-malarial fever prevails.

Principal Remedies.—The therapeutics of this form of fever will vary with the type of the fever, and the peculiarities of each individual case. The septic type will frequently be aborted by the timely use of *baptisia*; and the malarial type can be materially shortened by the administration of *gelsemium* during the stage of invasion. When these remedies fail to cut short the disease before the end of the first week, *bryonia* will generally be needed. And if in from two to four days no improvement appears, *bryonia* should give place to *rhus tox.*, and especially if there is diarrhea and the stools are black-brown, and involun-

tary. *Arsenicum* follows well after rhus tox., and is adapted to the second and third weeks of the fever. For hepatic disturbances *mercurius* will frequently be needed. *Hyoscyamus*, *stramonium*, or *belladonna*, will prove a valuable intercurrent remedy, when stupor or furious delirium supervenes. *Arnica* is indicated as an intercurrent when there are involuntary discharges of stool and urine. When the pneumonic symptoms are strongly marked, and have not been relieved by *bryonia*, and there is a violent dry racking cough, *Phosphorus* often helps. "Stools, black like coffee dregs," is an additional indication for phosphorus. *Tart. emet.* will be of service when there are mucous rales, and threatened cedema of the lungs. A tardy convalescence calls for either *Phosphoric acid* or *cinchona*.

Baptisia.—Corresponds with the first 7 or 10 days of the fever, and is our nearest similitum for the congestive and catarrhal changes occurring in the intestinal tract during this period. It has a marked action to clean the tongue, and causes an early return of appetite. A soreness on lying, and a sense of being all to pieces, are characteristics. Typho-malarial fever, not typhoid fever, is the fever that is "broken up" by the administration of *Baptisia*; as typhoid fever will run its typical course in spite of treatment.

Bryonia.—Stands next to *baptisia*. It has a longer action than *baptisia*, and corresponds to forms that run a mild or moderately intense course. It frequently cuts the fever short at the end of the second week if not before. Moderately severe cases frequently need no other remedy. Nightly delirium does not in any stage contra-indicate, but on the contrary is an additional indication for, *bryonia*.

Rhus tox.—Is indicated for a more intense character of the disease, and when there is excessive reactive endeavor with insufficient reactive power. It corresponds to all the stages, but seldom cuts the fever short. A red triangle at the tip of the tongue is characteristic.

Arsenicum alb.—Follows *Rhus* well, and especially if the adynamic state is strongly marked. Marked remissions of the fever are quite characteristic of this remedy. Weak and debilitated individuals frequently respond, as if by magic, to the action of *arsenic*.

Gelsemium.—Is specially useful in the early stages of the malarial type of this form of fever. There is great nervous restlessness, and muscular weakness. The pulse is full and soft, but not very rapid. The tongue is moist and coated with a white fur. After the end of the first week either arsenicum or bryonia will be needed to complete the cure.

Mercurius.—Is oftener indicated in typho-malarial fever, than in typhoid fever. An icteroid hue of the skin, hepatic tenderness, and a painful sensibility of the abdomen, are among the more prominent symptoms. Mercurius is never indicated when there is delirium and the tongue becomes dry.

Phosphorus.—Is the remedy for the lung complications, and when colliquative diarrhea occurs as a sequel.

Phosphoric Acid.—Will frequently prove useful in cases complicated with scurvy; and when convalescence is protracted and there is great prostration.

Additional indications for these, and for other less important remedies for typho-malarial fever, have already been mentioned in a general way in connection with the treatment of malarial fevers. They will, however, be specially considered when we come to speak of the treatment of typhoid fever.

HYGIENIC AND DIETETIC TREATMENT.

The sick room should be large and well ventilated. The temperature of the apartment should be maintained at from 60° Fahr. to 70° Fahr. Mental quietude is extremely important. If the fever runs high the *cold bath*, as recommended by some of our writers, if used at all, should be used with extreme caution, for typho-malarial fever patients do not always stand this treatment well.

The best drink is pure water. But wine and water, lemonade, iced tea with lemon juice, or thin barley water are all grateful.

The diet should be restricted and for the most part liquid. It should be administered with regularity, and as often as every hour or two when there is great prostration. Milk occupies the first place as a food. It may be given either raw or boiled. Butter-milk or koumyss may be given occasionally as a substitute for milk. Beef tea or chicken broth containing a little barley is very nutritious and is oftentimes quite palatable to the patient.

The addition of two or three grains of pepsin* to each cupful of milk or broth facilitates digestion. Alcoholic stimulants are unnecessary unless there are signs of heart failure. In the majority of cases they are not needed before the end of the second week. The best effects are obtained from claret or champagne. Whisky or brandy may be given in the form of milk punch or commingled with water. During convalescence the diet should be restricted to milk, koumyss, eggs, custards, farinaceous foods, and animal broths. At the end of a week solid food and particularly meat may be taken. Milk punch, egg-nog, and wine are often of service during convalescence. And as early as practicable a brief journey to the sea-shore, or at least a change of climate and scenery will aid materially in bringing about a rapid restoration to health.

*Hawley's saccharated pepsin is the best. Fairchild's essence of pepsin stands next.

LECTURE IX.

Hay Fever.

Hay fever may be justly classed among the miasmatic diseases, as it is caused by the action of an agent which originates outside the susceptible organism, and floats in the atmosphere, and cannot be conveyed from one susceptible person to another.

Definition.—It may be defined as a miasmatic disease caused mainly by the action of the *pollen* of plants and grasses upon the organs of respiration. It is confined almost wholly to the educated classes, and occurs mostly between the ages of 15 and 45. It appears in two forms; the *catarrhal*, and the *asthmatic*. The *catarrhal* variety is characterized by the discharge of thin watery serum from the nostrils, by violent attacks of sneezing, by redness and swelling of the eyelids, by severe lachrymation, and by a slight burning feeling in the mucous membrane of the mouth and fauces. The *asthmatic* variety is in addition constantly accompanied by laryngo-bronchial catarrh. Its asthma is peculiar in that it occurs mostly in the day time, and varies from a moderate cough to intense and distressing dyspnoea. Hay fever usually attacks its victims annually, either in June, August or September; and the earlier the attack the milder its course. It appears suddenly, remains about six weeks, and departs as suddenly as it came, leaving behind no perceptible effects.

Synonyms.—It has been variously named, Rose cold, June cold, Bostock's catarrh, Pollen catarrh, Pollen asthma, Hay asthma, Rye asthma, and Catarrhus æstivus.

History.—Hay fever had its birth-place in England. It was

first described by Bostock, himself a victim, in 1819. In 1854 Phœbus of Giessen, gave an analysis of 300 cases. Dr. Wyman, of Harvard University, in 1872 described the disease under the name of autumnal catarrh. And the following year Dr. Beard published his treatise on hay fever or summer catarrh. More recently Dr. Blackley has given to the profession the important results of his experimental studies, extending over a period of ten years. Hay fever is especially prevalent in England, and is rapidly becoming a common disease in the northern sections of this country.

Etiology.—The causes of this affection are of two kinds, predisposing and exciting—

1. The predisposing causes:

Hay fever is a disease of the upper classes of society, and physicians are frequent victims. It attacks only people predisposed to it, and mainly such as are of the Anglo-Saxon race. Nervous temperaments are particularly susceptible. The degree of susceptibility will vary in different individuals, and a given pollen may be highly irritating with one person and comparatively mild with another. The susceptibility becomes more marked in each succeeding year. The disease attacks individuals under forty years of age only; and prevails more among males than females. Hereditary tendency is supposed by some to play an important part in its causation.

2. The exciting causes:

Hay fever appears usually in early summer and mid-summer. It is caused by the presence of the *pollen* of flowering plants in the atmosphere, and its irritant action on the respiratory mucous membrane of susceptible individuals. The time of flowering of hay grass, Indian corn, and especially of the rag-weed (which begins the latter part of August, and continues through September) is most favorable to its development. The pollen belongs to the non-coherent class, and as it floats in the air is dry and shrivelled. In the dry as well as in the fresh state it is capable of producing all the symptoms of this distressing malady. The pollen of plants that have flowered prematurely does not possess the activity of that which is generated later. Temperature exercises an important influence upon the production as well as activity of pollen. A low temperature below a certain point not only lessens the quantity thrown off, but also causes

that which is generated to act with less vigor. Rainy weather notably diminishes the quantity. Hence hay fever patients suffer less in cold and wet summers than in warm and comparatively dry seasons.

The disturbance caused by the pollen is due partly to its mechanical effect and partly to the physiological action of its granular matter. Blackley thinks that the sneezing and discharge of serum of the first stage, are due to the mechanical changes incident to the development of the pollen tube, from the influence of the moisture of the nasal passages on the pollen, and its penetration into the mucous follicle. And the swelling caused by the effusion of fluid into the submucous cellular tissue is due to the presence of some substance or quality in the granular matter.

Hay fever attacks are more violent in the country than in the city, and in the open air than in-doors. In this country the disease prevails mostly throughout the North, while nearly the whole of the Southern States is entirely free from it.

Varieties.—It may exist in either of two forms—the *catarrhal* and the *asthmatic*—and each form is made up of three stages—

1. *The stage of development*: which lasts from one hour to a few days.

2. *The paroxysmal stage*: of three or four weeks' duration.

3. *The stage of convalescence*: of short duration.

Both varieties may exist together, or either one of them may appear alone.

Clinical History.—The *catarrhal* form runs its course with little or no pain, and no important symptoms. The first symptom is generally a mild or severe itching in the fauces, Eustachian tubes, and the nostrils. Violent attacks of sneezing soon occur, followed by a discharge of thin watery serum from the nostrils. The nasal mucous membrane swells more or less rapidly, according to the amount of pollen in the respired air. Frequently the swelling is so great that the nares are closed. If the patient takes the recumbent position on the side, the swelling subsides in the nasal passage which is uppermost, since the oedematous effusion gravitates towards the lowest part. As the height of the hay season approaches, the paroxysms of sneezing, which have hitherto occurred mostly during the day, are apt to appear

also at night. After a time the sensibility of the highly swollen Schneiderian membrane becomes lessened. Later the membrane becomes thickened, and ultimately even purulent. The eye symptoms generally follow the nasal symptoms and are initiated by an attack of itching. As the season progresses the itching becomes more troublesome, and is frequently attended by a slight burning sensation. Occasionally shooting neuralgic pains are felt in the back part of the orbit and in the eyeball. In severe attacks the eyelids become cedematous, and slight chemosis is established. When the disease is fully developed the lachrymal canals and nasal ducts become almost entirely closed by the swelling of the submucous tissue. The discharge is at first thin and watery, then thicker, and in exceptional cases, purulent. The mucous membrane of the fauces and mouth is not as sensitive to the action of the pollen, as that of the nares. The pharynx is the seat of an itching and slight burning or pricking sensation. The itching is apt to be severe in the hard palate, the upper part of the pharynx and in the Eustachian tubes. Sometimes there is slight deafness, which occasionally tends to linger. Rarely there is hoarseness and a moderate cough. The chemosis and the cedema of the eyelids are generally the last symptoms to disappear.

The *asthmatic form* is constantly accompanied by laryngo-bronchial catarrh, and in many of its symptoms closely resembles ordinary asthma. After the coryza and eye symptoms of the ordinary catarrhal form have been in existence a variable length of time, a difficulty of breathing appears. Sometimes however they will come together. The first symptom of an asthmatic attack is a sense of tightness and weight across the chest. The difficulty of breathing is greatest during the night, but may be somewhat severe during the after part of the day, from the increased inhalation of pollen. Patients frequently complain of a feeling as of a band passing around the head above the eyes. After the catarrhal symptoms have existed for some time a cough appears. In some cases this cough is moderate, and is attended with some expectoration and slight dyspnoea; whilst in others it is dry and spasmodic, and is accompanied by marked asthmatic symptoms, with great dyspnoea and anxiety. The sputum is at first thin and frothy, later it may be purulent. In the declining stage of the disease there is a marked tendency for the discharge from the nostrils to become puriform.

In some instances, after a long and violent attack of sneezing, a slight fever is discernible. The pulse will then be frequent and full, the face flushed, and the respiration more rapid. This temporary feverish state is apt to end with a slight shivering, and a cold perspiration. Active exercise produces marked aggravation of all symptoms. Hence hay fever patients should keep on hand a generous supply of "fatigue material."

After these symptoms have prevailed with greater or lesser intensity for three, four or six weeks, they begin to decline, and the patient enters convalescence. The recovery is usually rapid. The asthma departs suddenly, often in a single night, and the catarrhal symptoms vanish within two or three days. Frequently the attacks are prolonged by renewed exposure to the influence of pollen.

ANALYSIS OF CHART.

The Schneiderian Membrane.—In the earlier years of the disease, the action of the pollen is most marked in the nasal passages. In the first stages of the disorder the fits of sneezing are not very long nor very severe, but later on they become so violent that for the time being the patient loses all self-control. He may sneeze twenty or thirty times in succession. Occasionally a profuse cold sweat will break out at the termination of each sneezing attack. The frequency of the sneezing paroxysms, and the profuseness of the discharge of thin watery serum depend largely though not entirely, upon the quantity of pollen inhaled. After a time the *alæ nasi*, as well as the mucous membrane lining the nasal passages, become inflamed and tender. As the disease progresses the discharge from the nostrils tends to become inspissated and puriform, especially early in the morning.

The Eyes.—In most cases the irritation of the eyes follows that of the nasal passages, but if the wind is moderately strong, and in consequence thereof an extra quantity of pollen is brought into contact with the conjunctiva, it may appear earlier than the nasal symptoms. The first symptom is usually a troublesome itching. The swelling and occlusion of the lachrymal canals and nasal ducts, is caused in part by the irritation of the pollen which passes down the duct from the eyeball, and in part by that which is deposited in the nostril during respiration. The

CHART VII.—*Hay Fever.*

Etiology:	The pollen of plants and grasses.		
Time of appearance:	From July to September.		
CATARRHAL FORM			
Stage	Stage of development.	Paroxysmal stage	Stage of convalescence
Duration:	1 hour to 48 hours	3 to 4 weeks.	12 hours to 32 hours
Nose:	Itching. Sneezing in day-time. Watery discharge	Swelling of mucous mem Sneezing, day and night Discharge, watery & thin, or else inspissated or puriform	Discharge at times puriform.
Eyes:	Itching and Lachrymation.	Itching. Lachrymation Neuralgic pains. Edema of lids. Chemosis	Edema of lids and Chemosis.
Mouth and fauces:	Itching.	Itching and slight burn'g.	
Ears	Itching	Slight dullness of hearing	
Skin	At times a papular eruption is present		
ASTHMATIC FORM.			
Stage:	Stage of development.	Paroxysmal stage	Stage of convalescence
Duration:	1 hour to 48 hours.	3 to 4 weeks,	1 to 3 days
Nose, eyes, mouth and fauces.	Symptoms same as in the catarrhal form.		
Larynx and trachea:	Difficulty of breathing.	Slight hoarseness.	Slight obstruction of breathing.
Bronchi.		Wheezing Rales. Cough, moderate or severe. Dyspnoea	
Sputum:	Thin, frothy, and containing granules.		
Ears:	Slight deafness.	Tinnitus aurium.	
Head:	Feeling as of a band around the head above the eyes		

itching and burning in the eyes cause a constant desire on the part of the patient to rub them. Chemosis is only produced when there is a maximum quantity of pollen in the air, or when the patient is very sensitive to its action. Photophobia is occasionally added to the discomfort of the temporary invalid. The discharges from the eye are at first thin and watery, later they become inspissated. In ordinary hay-fever attacks, the mischief does not extend beyond the sub-conjunctival cellular tissue.

The Mouth and Fauces.—The itching sensations in the mouth and fauces usually follow those of the eyes and nasal passages. They are seldom very strongly marked, and deglutition is rarely interfered with. At times there is a sense of dryness and obstruction in the throat on awaking in the morning.

The Respiratory Tract.—Chest symptoms appear only in the asthmatic variety. The first asthmatic attack usually comes on in the day-time, after the coryza and lachrymation have become well-marked. And when asthma once appears it is apt to continue with more or less severity during the whole of the hay season. In some cases the dyspnoea becomes so urgent that the patient is unable to lie down. A scanty expectoration is usually accompanied by more dyspnoea than a copious one. The dyspnoea is due to the tumefaction of the bronchial mucous membrane, and the consequent interference with the free transmission of air, which causes imperfect oxygenation of the blood. Emphysema of the lungs, which is a common sequel of ordinary asthma is rarely, if ever, found to follow hay asthma.

Differential Diagnosis.—From ordinary *sporadic catarrhs*, the catarrhal variety of hay fever may be distinguished by its returning annually at the regular season, and by the attacks being more violent during a residence in the vicinity of fields of flowering grasses and cereals. Flakes of epithelium which are frequently found in the effused fluid in severe attacks of common coryza, are seldom if ever found in hay fever.

From *common asthma* the asthmatic variety may be easily differentiated. The first attack of the season of hay asthma appears in the day-time, after exposure to the influence of pollen. The first attack of ordinary asthma comes on at night, and frequently after a dyspeptic siege. A primary attack of ordinary asthma generally comes on in-doors, that of hay asthma often

comes on in the open air. The paroxysms of ordinary asthma are intermittent in character, while those of hay asthma are apt to be remittent. The coryza of common asthma is never as severe as that of hay asthma. Hay asthma is a disease of the summer months, while common asthma is most prevalent during the winter season.

Prognosis.—The prognosis is always favorable, though the disease tends to return in succeeding years.

Treatment.—**PROPHYLAXIS.**—The preventive treatment consists mainly in the removal of the patient beyond the reach of pollen. High altitudes and the open ocean are most free from it. Hence a residence at such places as Deer Park, or Jefferson, or Paul Smith's in the Adirondacks, or a sea voyage is an unfailing remedy. Many would-be victims escape by a timely removal to the sea-coast. Such patients are quite comfortable and enjoy immunity from the attacks, as long as the sea breeze blows, but are more or less affected as soon as a land breeze appears.

Sulphur, if taken before the hay season sets in, will to a limited extent modify the attacks, but the *Arsenicum iodide* is our best prophylactic remedy. Dr. Sebastian, of Texas, has experienced good results from the wearing of a thick veil during the hay fever season. In men, the respirator, alluded to in the lectures on malaria, might be worn instead of the veil.

The following localities and places of escape from the domain of pollen, are mentioned by Dr. Morrill Wyman: The Glen, Gorham, Randolph, Jefferson, Whitefield, Bethlehem village, the White Mountain Notch, and the Twin Mountain House, in New Hampshire; Mount Mansfield, in Vermont; the Adirondacks; the Island of Mackinaw; the Lake Superior region; the Allegheny Mountains at Oakland, and the Iron Mountain. A certain immunity is experienced at Fire Island, off the coast of Long Island, and at Beach Haven on the Jersey coast.

From this locality (Chicago), patients frequently go to places in Northern Michigan, Wisconsin, or Minnesota, during the hay fever season. English physicians often send their patients to the Highlands in Scotland, or to the mountainous districts in Wales.

Palliative Treatment.—Nasal douches, or spray inhalations of a solution of glyceroborate of calcium, dry inhalations of an

iodine and ether solution, or insufflations of *Mercurius corr.*, 1st cent. trit., or *Argentum nitricum*, 1st dec. trit., may prove highly serviceable during the attack. A weak galvanic current will greatly relieve the frontal headache. The irritation of the eyes and face may be allayed by bathing the parts several times per day, in hot and cold water, alternately. Voluntary prevention of sneezing will greatly benefit mild cases. Pressing firmly on the upper lip, when the inclination is felt, will frequently arrest a sneezing paroxysm. *Arsenate of Quinine* and Turkish baths are occasionally of service for the prostration.

Leading Indications.—Change of climate is the most effective remedy. Patients unable to go away during the hay fever season, may however be greatly benefited, and at times cured, by internal treatment.

Aconite.—In plethoric, active individuals, and when there is febrile disturbance, photophobia, and a feeling as of sand in the eyes. Violent sneezing with slight discharge of blood from nose and larynx. Loud, dry, hard cough, before or after sneezing. Numbness in the back part of the throat. After mental excitement.

Allium cepa.—Burning, acrid discharge, with violent laryngeal cough. Smarting of the eyes with violent sneezing. Must take a long breath, and then sneeze accordingly. Worse in the evening and in a warm room. Symptoms begin on the left side and travel to the right.

Ammonium mur.—Burning in the eyes, and lachrymation at night. Rawness and soreness in the fauces. Is obliged to clear the throat frequently. Burning in *small spots* in the chest. Itching in the larynx. Dyspnoea on moving and when lying.

Aralia racemosa.—Smarting soreness of posterior nares and *alæ nasi*. Frequent sneezing. Warm salty taste in the mouth. Dry, wheezing respiration, with rapidly increasing dyspnoea. Suffocative feeling on lying down. Loud whistling, worse during inspiration. Excessive sensitiveness to slight changes of temperature.

Arsenicum alb.—Is the best remedy for a watery, acrid, exoriating discharge, with thirst, burning sensations about the nose, eyes, throat and chest. Great restlessness and anxiety, and

extreme debility. Dyspnœa, especially when paroxysms are worse from midnight till day-break. Pain extending from the small of the back to the thighs, when coughing. Symptoms worse from the least bodily exertion, and from a change of weather.

Arsenicum iodide.—In individuals of pale, delicate complexion, and when there is a tendency to glandular enlargement. Puffiness of the lids. Burning sensations in the nostrils and throat. Discharge irritating and corrosive. Worse in the morning, or after meals.

Arum triph.—Sneezing, with acrid, fluent discharge; excoriation of nostril and upper lip. All the symptoms are worse at night.

Asarum.—Fluent discharge with deafness. Sensation as if the ears were plugged up with something.

Badiaga.—Spasmodic cough with sneezing and lachrymation. Yellow viscid mucus flies from the mouth and nostrils during the paroxysm.

Belladonna.—In plethoric individuals, and especially in children and females of an irritable disposition. Dryness of the mouth and throat. Offensive smell, after blowing the nose, as of herring-brine. The cough causes sharp cutting pains in the head. The paroxysms occur in the afternoon and evening, and are accompanied by a sensation as of dust in the lungs. All the symptoms are aggravated by exposure to the least current of cold air.

Camphor.—The 1st attenuation of camphor, if taken as soon as the first symptoms appear, will frequently produce a marked amelioration.

Cyclamen.—When there is a great deal of sneezing, with rheumatic pains in the ears and head. Loss of smell.

Euphrasia.—When the force of the disease is concentrated on the eye and its surroundings. In the early stages, as soon as the watery discharge and sneezing begin. When there is severe itching and burning at the margin of the eyelids, with swelling of the parts. Dry tickling cough in the day-time, better from eating, and drinking small quantities. After windy weather.

Gelsemium.—Malaise. Mucous discharge from the nose and throat. Feverishness. Pain in the throat running up to the ear when swallowing. Sensation as of a stream of scalding water passing from the throat up into the left nostril. Hardness of hearing. Sighing respiration.

Grindella robusta.—In the asthmatic variety. Inhalation easy but expectoration difficult. Accumulation of tenacious mucus in the small bronchi. Excessive nervousness.

Ipecacuanha.—In the asthmatic form. Long continued, exhaustive fits of coughing, with suffocative spells. Gasps for air at an open window. Cough causes gagging and vomiting, which brings relief. Worse from the least motion.

Kali bich.—Adapted to light-haired individuals. Burning of mucous membrane, extending from the throat into the nostrils. Aching pain at the root of the nose, with fluent, acrid discharge. Pinching pain across the bridge of the nose, relieved by hard pressure. Hoarseness and oppressed breathing. Wheezing cough with expectoration of tough, stringy mucus. Cough excited by eating or drinking. Sore, ulcerated spots on the mucous membrane. Foul tongue. Complete loss of smell. Has been successfully used as a prophylactic.

Kali hyd.—Swelling and redness of the nose, and œdema of the eyelids. Burning, corroding discharge from the nostrils. Painful hammering in the frontal region. Oppression of breathing with pain in both eyes. Hoarseness. Wheezing and rattling in the chest. White, frothy expectoration. Choking sensation on awaking.

Lachesis.—Excessive sneezing, with copious discharge of watery mucus. Swelling and soreness of the nares and lips. Feeling of constriction in the throat and chest. Sensitiveness of the larynx with a feeling of suffocation when touched. Oppressive pain in the chest, as if full of wind. Dyspnoea worse after sleep, and after eating. All symptoms are worse during the day, or on falling asleep. May be used to remove excessive susceptibility.

Mercurius.—Frequent sneezing, with swelling, redness, and soreness of the nose. Acrid excoriating discharge. Mutus has an unpleasant odor. Inclination to vomit during coughing. Violent night cough. Pain in the limbs.

Nitric acid.—Sticking sensation behind the sternum, as from splinters. Malar bones are sore. Useful in the latter stages when the discharge from the nostrils is thick and puriform.

Nux vom.—Feeling of dryness in the posterior nares. The nose is obstructed in the day-time, but discharges in the evening.

Opium.—When the asthmatic attacks come on during sleep, and are apt to be followed by violent fits of dry, racking cough, relieved by drinking.

Pulsatilla.—When the discharge has considerable consistence and there are alternate stoppage and discharge. The discharge is more copious in the open air. In hysterical individuals, or when accompanied by deranged menstruation. Sudden prostration with palpitation of the heart. Dizziness on rising from a seat. Copious vomiting of mucus. Constant chilliness. Loss of smell. Aversion to milk and fat food.

Rumex crispus.—Sore feeling in the eyes. Violent and rapid sneezing. Fluent discharge with painful irritation in the nostrils. Dryness in the posterior nares.

Sabadilla.—Violent sneezing. Copious watery discharge from the nose and eyes. Severe frontal pain. Redness of the eyelids. Lachrymation in the open air, and when looking at a bright light. Dryness of the mouth, without thirst. Muffled cough, worse on lying down. Chilliness with heat of the face. Painful lameness in the knee joints. Is highly recommended by Dr. Bayes.

Sanguinaria.—Frequent sneezing, worse on the right side, aggravated by odors. Watery acrid discharge. Smell in nose like roasted onion. Severe pain at the root of the nose, and in the frontal sinuses, with dry cough, and pain in the chest. Burning dryness of the mouth and throat, not relieved by drinking. Pressure and heaviness in the upper part of the chest, with difficulty of breathing. Soreness and burning in the lungs. Wheezing, whistling cough, and finally diarrhea which relieves the cough. Cough worse at night. Passage of flatus with the cough. Bad smelling sputa. Circumscribed redness of the cheeks.

Sticta pul.—Incessant sneezing, with burning in the eyes. Splitting frontal headache with a feeling of fullness at the root

of the nose. Excessive dryness of the nasal mucous membrane. Dryness of the throat, worse at night. The secretions dry rapidly, forming scabs difficult to dislodge. Tickling in the bronchi and larynx. Incessant, racking cough, provoked by inspiration.

Sulphur.—Sneezing on first awaking in the morning or on lying down in the evening. Profuse perspiration after sneezing or coughing. Continued oppression of breathing between the paroxysms. Soreness and ulceration of the nostrils. Roughness and dryness of the throat. Burning sensation in the trachea. Expectoration of a tenacious bronchial mucus.

Tartar emet.—Great rattling of mucus, with oppressed breathing. Stoppage of the nose, alternating with fluid discharge. Epistaxis followed by fluid discharge with sneezing. Loss of taste and smell. Rheumatic aching in the muscles and joints.

Ambrosia art. has been used with good success in varied types of hay fever.

For additional indications, consult Lecture xvii, on the treatment of influenza.

LECTURE X.

Typhoid Fever.

At my last lecture I completed the description of the first class of fevers—the *miasmatic*. To-day I will commence the history of the second class—the *miasmatic-contagious*. The typical disease of this class is *Typhoid Fever*.

Definition.—It may be defined as an acute endemic fever, lasting about twenty-eight days or longer, due to a morbid agent—supposed to be a rod-shaped bacterium—associated with certain forms of decomposing animal matter. It is characterized by a gradual approach, marked by malaise, anorexia, dull headache, epistaxis and a bronchial cough; “a red or dry and brown tongue; tympanites and abdominal tenderness; diarrhea with “pea-soup” discharges; rose-colored spots, after the seventh day, appearing in successive crops; stupor and delirium; late prostration and protracted convalescence. Constant lesions of the solitary and agminate glands of the ileum, with enlargement of the spleen and mesenteric glands, are found upon examination after death.

Synonyms.—Nervous fever. Enteric fever. Autumnal fever. Infantile remittent fever. Gastric fever. Mucous fever. Red-tongue fever. Endemic fever. Pythogenic fever. Abdominal typhus.

History.—According to traditions typhoid fever has prevailed from earliest times. Hippocrates is credited as having narrated its symptoms in the first and third books of the *Epidemics*, and Galen described it under the name of *hemitriticeus*. During the

17th century it prevailed in Europe and was described as the *febris semitertiuna*. Strother, Huxham, Manningham, De-Haen and Stoll outlined it in the eighteenth century. Petit and Serres of France, about the beginning of the present century, first demonstrated that the intestinal lesions were limited to the lower part of the ileum. Bretonneau, in 1826, proved that the agminate and solitary glands of the ileum were always implicated in the pathological processes. He named the disease *dothienenterie*. Louis in his elaborate work, published in 1829, named it *fièvre typhoïde*. Drs. Gerhard and Pennock of Philadelphia, in 1837, clearly outlined the difference between typhoid fever and typhus fever. From this time the doctrine of the identity of these two fevers gradually lost foot-hold, and finally was completely overthrown by the series of papers published in the *Medical Times* (1849-52), by Sir William Jenner. At the present day the doctrine of their non-identity is generally entertained in all parts of the world.

Geographical Distribution.—Of all the fevers, this is the one most universally prevalent. It has been observed in all countries and in every clime, but prevails to the greatest extent in the temperate zone. It is endemic in the British Isles and in all parts of Europe. On this continent it is endemic from Hudson's Bay to the Gulf of Mexico, and from the Atlantic coast to the Rocky Mountains. It has been met with in India, Egypt, and Australia, and has been reported as extremely common in Brazil and Peru.

Etiology.—The causes of this fever may, for convenience of study, be arranged under the two familiar heads, *predisposing* and *exciting*.

1. *The predisposing causes.*—*Climate*, indirectly, exerts considerable influence in the development of typhoid fever. For while the disease is met with in all countries it is especially prevalent in the northern temperate zone. It frequently prevails in the same locality, year after year, when the surrounding conditions are favorable. As regards the *season* of the year, it shows a decided predilection for the autumn; hence the name, Autumnal fever. It increases from July to November, and then gradually declines, and becomes less frequent from February to April. The intensity of the disease is generally greater the later it be-

gins. It is always more prevalent in the country after hot and dry summers, than after cold and wet ones. Buchanan and Liebermeister have shown that the prevalence of typhoid fever is somewhat dependent upon changes in the height of the deeper springs of water, and that in localities where the disease is endemic, and the specific cause is in the earth or percolates from privy-vaults into the earth, the lower the water-level, the more abundant is the fever poison.

A decided predisposing cause pertains to *age*. It is pre-eminently a disease of early adult life, and occurs most frequently between the ages of 15 and 30. It is rarely met with at either extreme of life. It attacks by preference the strong and the healthy, and lurks alike in the palaces of the rich and the hovels of the poor.

Frequently *individual idiosyncrasies* exist, which seem to predispose to its attacks. Some contract the disease on the slightest exposure to the influence of the morbid agent, while others escape even after frequent and prolonged exposures. In all, the great predisposing cause is the special susceptibility of Peyer's patches to the influence of the germ.

Habitual exposure to the poison in those not otherwise predisposed, confers a certain immunity from the disease. So does a previous attack of the fever, for, apart from relapses, it seldom occurs a second time in the same individual. And clinical experience further demonstrates, that pregnant, parturient and nursing women, are rarely affected.

2. *The exciting causes.*—The exciting causes of typhoid fever cannot as yet be definitely outlined. We presume it to be an organized germ, and to-day know its nature only by its effects. Professor Klebs, of Prague, believes that he has discovered the specific poison, and describes it as a rod-shaped bacterium about .004 inch long. He affirms that numbers of these micro-organisms have been constantly observed in those organs which are most affected by the disease, and that they have been found only in connection with typhoid fever. Letzerich announces that he has transmitted typhoid fever from man to rabbits by introducing, per os as well as hypodermatically, inferior organisms suspended in distilled water, and obtained by repeated washings of the dejections of typhoid fever patients. Other experimenters, to a limited extent, corroborate these statements, and further re-

searches may, at a not far distant day, succeed in establishing the causal relation between these microbes and typhoid fever. For the present, however, the morbid agent is to us an unknown quantity, and we must content ourselves with simply understanding its properties.

As we analyze the peculiarities of the typhoid poison, and the course of the disease, the following facts are demonstrable:

1. Typhoid fever never occurs spontaneously, but is always due to a disease germ, originating from some previous case of typhoid fever.

This view was first promulgated by von 'Gietl, of Munich, and was afterwards ably advocated by Dr. Budd, of England. And it is now generally recognized that when the disease appears in a locality, its development is preceded by the introduction of the specific typhoid poison, which has been reproduced in connection with decomposing organic matter—in most cases human excrement.

Neither sewer gas nor the effluvia from privy vaults are capable of generating the disease. Filth does not create it, nor can the decomposition of organic and excrementitious substances alone produce it. It is necessary that the specific typhoid poison be incorporated in the decomposing masses, and when this is done the latter may become a germ center. Soil pipes and sewerage may be defective for a long time, animal and vegetable decomposition may be constantly taking place, and yet no case of typhoid fever occur, until some individual having the disease comes within the district, or some substance containing the typhoid poison is brought within the boundaries favorable to its multiplication and growth.

The apparently autochthonous or spontaneous cases of the fever may be easily accounted for by remembering that mild or walking cases of typhoid, not recognized as such, or a case of simple intestinal catarrh due to the influence of the typhoid morbid agent, may import the disease germs into a hitherto non-infected locality. And again it is possible for the germ to be transported from an infected to a non-infected locality in the bed-linen, clothing, or other articles soiled by the dejections of patients, which may thus act as *fomites*. For already it is a demonstrated fact that the changes which take place in the stools of typhoid fever, and cause the reproduction and perfecting of

germs, may take place in the excrement discharged into the bed-linen or on the clothes of the sick, as well as in drains and sewers and privy vaults.

In whichever way it is introduced into a locality hitherto free from it, the affection spreads not by direct contagion, but on account of cess-pool, privy or sewerage contamination from the dejections of some typhoid patient. Therefore as typhoid fever is never contagious from person to person, and never originates spontaneously but by continuous transmission of the poison, it justly belongs among the miasmatic-contagious fevers, in the sense in which they were defined in our introductory lecture.

2. Like the germs of other acute infectious diseases the germ of typhoid fever is, after introduction into the human organism, and under favorable circumstances, capable of indefinitely reproducing itself.

The time taken to so reproduce is known as the period of *incubation*. Its length is somewhat variable. It is longer when the specific poison finds access to the system by the ingesta, than when it reaches it through the inspired air. Being often an unascertainable time, the period of *invasion*, if not marked by rigors, is reckoned from the day on which the patient betakes himself to the bed. The prodromal symptoms are usually more severe in children than in older individuals. The duration of this stage varies according to the constitutional peculiarities of the patient. It ranges from fourteen to twenty-one days.

Frequently the germ finds access to a system which is to it but barren soil. The surroundings are not such as to enable it to undergo the changes and indefinite reproduction necessary to give rise to typhoid fever. Acclimatization, a previous attack, and old age, may be mentioned as favorable conditions for the non-reproduction of the germ.

3. The typhoid specific poison passes out of the organism with the fecal discharges, but is not capable of producing typhoid fever immediately, but must first undergo certain changes outside the body, in connection with decaying organic matter.

The germ of typhoid is contained solely in the alvine dejections of the sick. And yet the fresh stools cannot communicate the disease, as the specific poison must go through a stage of development outside of the body. Hence attendants upon the sick do not contract the disease unless they are exposed to the

influence of the decomposing excrements. The patient's garments and bed-linen only communicate the disease when they have been soiled with the dejections which have been allowed to remain exposed long enough to undergo decomposition. The time of innocuousness of the stools after leaving the body is very short, seldom longer than twelve hours.

When associated with decomposing animal and especially faecal matters, the germ is capable of reproducing itself. It may be diffused primarily from individual-privy vaults, cesspools, or dung-heaps; and secondarily through soakage, from individual contaminated springs. In large bodies of open water and in running streams it is rendered speedily inert.

4. Under favorable circumstances, and in a soil fitted for its reception and growth, it may retain its activity for a considerable length of time after it has passed out of the organism, and is also, in this situation, capable of propagating itself continuously.

The typhoid germ possesses great vitality, and may retain it for a long time, during the stage of development through which it passes outside the body. And as Wilson says: It may be found everywhere, and is readily capable of transportation from place to place, but it lurks in dark neglected corners and about the foul ways of men's dwelling-places, and creeps along with oozing filth, crawling into wells and springs, and hiding itself in the ground, choosing now a victim, and again a group of them but never giving rise to pandemics, or in the wider sense, even epidemics, as do the poisons of typhus, cholera, or relapsing fever.

In cities the complex system of continuous drainage, intensified by that abomination, the ordinary pan water-closet, is occasionally conducive to local epidemics. But a case of fever cannot even here possibly infect the attendants if the alvine dejections are promptly disinfected, and swept away into properly constructed, well-trapped and well-ventilated sewers. It is only where the excrement is improperly disinfected, or thrown into improperly constructed sewers, that it becomes a focus of infection. In the country the close proximity of privy vaults, foul drains, or grave-yards, to drinking wells, is a common promotive cause.

Local epidemics are most frequently observed in small towns

and villages, while sporadic cases are constantly encountered in large cities and in crowded neighborhoods.

5. It may find access to the human body either through drinking water or by the inspired air.

The danger of infection is greater from drinking contaminated water than from any other source. But observation proves that the poison in contaminated water can be destroyed by boiling the water. Prof. I. Buckman asserts the presence of a peculiar "fungoid or confervoid" growth in water contaminated by sewerage or otherwise, and productive of typhoid fever.

The experience of late years has shown that milk and meat are each occasionally productive of outbreaks of this disease. This may be explained in either of two ways:

- a. The beeves and milch cows have typhoid fever, or
- b. The water in which the milk-cans are washed, or with which the milk is dishonestly diluted, contains typhoid germs.

The germs may also be propagated by the atmosphere, and infection can be produced by the inhalation of the exhalations from privies or sewers in which the typhoid poison exists. And whatever its channels of access to the organism it manifests a constant predilection for the lymph follicles of the ileum.

From this brief consideration of the etiology of typhoid fever we are led to the following conclusions:

1. That it is unquestionably a germ disease, although the nature of the morbid agent is yet unknown.
2. That it is a disease of early adult life; occurs independently of over-crowding; and attacks the rich as well as the poor.
3. That it is non-contagious; and can be communicated only through the excrements, which have undergone decomposition after their discharge.
4. That it is an endemic disease, and, unlike typho-malarial fever, prevails to a greater extent in the country than in cities.

Clinical History.—The course of this fever may be divided into the following six artificial periods, each one of which may be modified by complications or by treatment: the prodromic period, the first, second, third and fourth weeks, and the period of convalescence.

1. *The Prodromic Period.*—The disease may, in rare instances, set in abruptly with a chill followed by high fever, or be pre-

ceded by an attack resembling intermittent fever, but usually it is insidious in its approach. In most instances for several days preceding the onset of the fever, the patient feels weary, dull and indisposed to exertion. He complains of frontal headache, epistaxis, pains in the limbs, and "a tired feeling all over." His sleep is broken and unrefreshing. At the same time the appetite is diminished, and the tongue is swollen, and often heavily coated. Sometimes there are abdominal pains and diarrhea. After these symptoms have continued with increasing severity for five or six days, the fever appears, preceded either by a chill or chilly sensations alternating with flashes of heat, and the patient is compelled to take to his bed.

2. *The First Week.*—The onset of the disease dates from the first rise in temperature. In the first week, the fever steadily increases, and the temperature rise is gradual and uniform, with regular morning and evening variations (Fig. 10). The daily rise begins about midday and attains its maximum between eight o'clock in the morning and midnight. At this time the skin is usually hot and dry; occasionally in the morning it is moist, or even bathed in sweat. Sometimes chilly sensations are experienced as the fever increases during the latter part of the day. The headache now becomes violent, and the sleep is restless and disturbed. Between sleeping and waking there may be slight delirium. The patient feels tired, and complains of a feeling of general lameness. There are thirst and loss of appetite. The tongue is at first moist, swollen, and covered with a whitish-yellow fur; after a time it becomes drier, smooth, and red along the margins and tip, and is no longer swollen. In the majority of cases the bowels are at first constipated, but diarrhea appears sometime during this period. The stools are painless, brown, and either thick or watery. Occasionally diarrhea continues from the prodromic period, while not infrequently it is absent in the first week. Towards the close of the period, the abdomen becomes swollen, and is tender to pressure over the ileo-cæcal region. The spleen is enlarged. The urine becomes scanty, dark-colored, and at times shows faint traces of albumen; the urea is increased and the chlorides diminished in quantity. Frequently mucous rales may be detected in the posterior portions of the lungs. A circumscribed pink flush, which deepens towards evening, and resembles the flush of hectic, appears on one

or both cheeks. The highest evening temperature is usually reached at the close of this period.

3. *The Second Week.*—During the second week, the variations in temperature are but slight, and the fever remains at about the height reached at the end of the first week (Fig. 10). The skin is hot and dry, the face flushed and at times livid. About the tenth day the headache disappears, the patient becomes indifferent, apathetic and drowsy, but has no sound sleep. Hardness of hearing, caused by a catarrh of the Eustachian tubes, or as a result of the mental state, now appears. When the patient is interrogated as to his condition, he usually answers that he feels well. All muscular movements are feeble, tremulous and uncertain. The tongue is dry, red, fissured and covered with sordes. It is protruded with difficulty, and when protruded the patient fails to withdraw it, unless directed to do so. The patient lies on the back with the eyes half closed. Frequently there is subsultus tendinum and carphologia. He mutters incoherently, and at night there is wandering delirium. Not unfrequently the delirium is active, and patients may become maniacal to such an extent as to require physical restraint. The mind is often occupied with whatever matters engaged its attention just prior to the illness. The urine and fæces are often passed involuntarily; at times the former is retained, and contains a small amount of albumen. In most cases the abdomen gradually becomes tympanitic, and there is tenderness and gurgling, especially in the ileo-cæcal region. The diarrhea increases, and the stools are of a yellowish-green color, resembling at times pea-soup; hence the term “pea-soup discharges.” The spleen steadily increases in size, but owing to the tympanites, its borders can rarely be defined. An eruption, which is characteristic of the disease, appears between the sixth and twelfth days, and remains visible from eight to fourteen days. It consists of small, isolated, lenticular, light red spots, which disappear on pressure, and come out in successive crops. The spots vary in size from a point to a line and a half; and each individual spot remains visible for three days, and then disappears. They vary in numbers from a few to many and are usually most abundant upon the chest and abdomen. Two or three well-defined spots are sufficient to establish the existence of the fever. The eruption is generally most marked in cases which occur be-

tween the ages of ten and thirty. Sibilant and sub-crepitant rales are, upon physical exploration of the chest, found to supplement the mucous rales of the first week. These rales are indicative of an extension of the catarrhal processes to the smaller bronchi.

4. *The Third Week.*—In the third week, the morning remissions become more marked, and the fever changes from the continuous to the remittent form (Fig. 10). This change is usually a gradual one, but not infrequently it takes place suddenly, sometimes as early as the fourteenth day, with a high evening exacerbation followed by a decided morning remission. The severe symptoms of the second week, however, continue, and frequently increase in intensity. For it is not until the end of this period that the morning remissions begin to affect the general condition of the patient. And it often happens that the symptoms which belong to the latter half of the second and the beginning of the third week, and which collectively constitute the *typhoid state*, are not fully developed until after the middle of this period. The strength steadily weakens, and the patient is, now, no longer able to raise himself, or even turn in bed. The stupor deepens, and the fæces and urine are passed involuntarily, or the latter may be retained. Emaciation becomes more and more marked, and bed-sores are apt to form at points of pressure. Sudamina frequently appear on the neck, chest, and abdomen. The pulse grows frequent and feeble. It is during this period that most of the complications, especially those of the respiratory organs, are developed.

5. *The Fourth Week.*—The fever is now decidedly remittent, and as the defervescence draws to a close, becomes distinctly intermittent (Fig. 10). The morning fall in temperature is each day lower, and the evening exacerbation is less decided. There is a gradual amelioration of all the symptoms. The stupor disappears and the patient returns to consciousness. The tongue begins to clean, the thirst lessens, and the appetite returns. The tympanites diminishes, and the stools are less frequent, darker, and of greater consistence. The urine is increased in quantity and lighter in color. The skin is oftentimes bathed in sweat, especially during sleep. The pulse becomes less frequent, and fuller. And the spleen returns to its natural size. Notwithstanding an amelioration in all the other symptoms occurs dur-

ing this period, the emaciation progresses with marked uniformity, until the temperature range reaches the normal. And frequently, so great is the emaciation, that during the course of the disease the patient loses one-sixth or one-seventh of his body-weight.

6. *Convalescence*.—The disappearance of the fever marks the period of convalescence. Frequently in the early days of this period the morning temperature becomes sub-normal. From this time, the weight of the body rapidly increases, the appetite returns, and the patient gains strength daily. Relapses (Fig.11) occur in about three per cent of the cases, while “recrudescences of the fever” or attacks of “after fever” are easily brought about by such errors in diet as overfeeding or the too early indulgence in solid food, or by over-exertion mentally or physically. Danger of perforation of the intestine from deep ulceration of the glands of Peyer, exists always after the first week until late in convalescence. And it is not an infrequent occurrence for patients out of bed for a week or two, to die suddenly from this cause. Usually convalescence is tedious, and months frequently elapse before the average typhoid-fever patient regains his accustomed health.

LECTURE XI.

Typhoid Fever (CONTINUED).

In my last lecture I described to you the prominent symptoms of a typical case of typhoid fever. To-day, before proceeding to an analytical study of the principal symptoms of the disease, I would invite your attention to two types of cases which run an irregular course; I refer to the *mild* and the *abortive* forms.

1. *Mild Typhoid Fever*.—In mild or “walking cases” of typhoid fever, the onset is gradual, the symptoms are only moderately severe, and the fever runs its regular course, but is of low grade. In the majority of these cases the periods approach in orderly succession, but are shortened, so that the disease runs its course in from sixteen to twenty days. Upon the fourth or fifth day the temperature may reach 104° Fahr. Occasionally the temperature curve follows that of a typical case, and differs from it only by running one degree lower. Usually the eruption appears early, the spots are few, and there is only one crop. The diarrhea is mild in character; at times it is absent; and occasionally it alternates with constipation. Some cases of this type—the so-called “walking cases”—are so mild that the patients are not at any time confined to the bed. All cases of typhoid fever, however, be it remembered should take to the bed unreservedly and remain there until convalescence is fully established. For no matter how mild the attack, the intestinal changes may be such, that slight physical exertion shall in an unfortunate moment cause intestinal perforation, the almost inevitable termination of which is death from peritonitis.

2. *Abortive Typhoid Fever*.—This form is rare in this country

though not uncommon in Europe. It may be ushered in, either suddenly without prodromes, or gradually with all the symptoms of a typical case. The temperature curve follows the regular course during the first week, and by the evening of the third or fourth day may reach 104° or 105° Fahr. But after the middle of the second week, the fever may disappear abruptly, with profuse sweating, and the temperature may fall rapidly to the normal standard. The eruption, the diarrhea, the delirium, and all the urgent symptoms of the disease may be present, and yet before the termination of the second period, the patient may have fully convalesced. Positive evidence of the typhoid origin of these cases exists in the fact that on post-mortem examination, the characteristic typhoid lesions are found. As Wilson says, these irregular forms are analogous to modified small-pox, in which we have the primary fever well marked, but in consequence of the slight local lesions of the skin, and the absence of suppuration, there is no secondary fever. It is probable that they are to be explained upon the same ground, namely, that while the constitutional disturbance due to the primary action of the typhoid poison is very great, the intestinal lesion, for some unknown reason—doubtless dependent upon the constitutional peculiarities of the patient—is moderate, and the glandular deposit undergoes resolution without ulceration or sloughing. Dr. Cayley suggests that the cases of typhoid fever that are from time to time described as having been cut short by special remedies or plans of treatment, are really of this character, the observer having ascribed to the remedy changes which are, in fact, natural phenomena of particular cases of the disease.

ANALYSIS OF CHART.

The Digestive Tract.—At the outset of the disease the *tongue* is moist, and covered with a thin, whitish or yellowish-white coat. Towards the end of the first week it may become red at the tip and edges, and display a tendency to become dry in the center. It may remain moist and coated during the whole course of the fever, or as the disease passes into the second week it may become brown, dry and fissured. At any period the coating may become flaky, suddenly peel off, and leave the tongue of a shiny, beefy red appearance. Usually towards the third week the tongue is protruded tremblingly, and is dry, red and glazed, and shows a brownish streak along the center, or a triangular brown-

CHART VIII.—*Typhoid Fever.*

Character:	Non-Contagious.		A previous attack affords partial protection.	
	Three weeks.		Prodromal stage, 5 to 10 days.	
	First week.	Second week.	Third week.	Fourth week
Tongue.	White coating, Red edges and tip.	Dry, red, glazed	Dry Sordes. Brownish crusts.	Moist in recovery
Intestinal Canal:	Nausea Green- ish vomiting. Thin, brown dia- rrhea.	"Pea-soup" discharges	Hemorrhage	Indigestion
			Perforation.	
Temperature	Rises 2° and falls 1° every day Maximum on evening of fifth day	103° to 104°.	Oscillation. Falls 4° between night and morning.	Returns to the normal
Pulse:	100 per minute	100 to 110.	120 to 140 Dicrotic.	Approaches the normal
Skin:	Hot Hyperæsthetic "Musty odor "		Bed-sores.	Furuncles.
Eruption.	Rose-rash on seventh day.	Remains from 8 to 14 days. Each spot lasts 3 days		Sudamina.
Nervous Sys- tem:	Headache, wake- fulness	Somnolence Asthenic delirium	Delirium. Tremu- lousness. Subsultus tendin- um. Deafness.	Prostration.
Head:	Epistaxis	Face pale or livid. Cheek flushed.		Falling off of the hair.
Urine.	Diminished. Sp. gr. 1020 to 1030	Dark	Increased Light.	Opious. Pale. Sp. gr. 1008 to 1005.
Abdomen:		Tympanites. Right ileo-cæcal region tender after the 6th day	Gurgling.	
Complicati'ns.	Bronchial catarrh.	Bronchial catarrh Intestinal perforation.	Lobular pneumonia. Parotitis.	
Eye's Patch- es;	Catarrhal inflam- mation. Medullary infil- tration	Follicles swollen. Softening and Necrosis.	Ulceration	Cicatrization.
Spleen		Enlarged.		Diminished.
Sequels:	Debility.	Paralysis.	Abscesses.	
Prognosis:	Mortality, 14 in 5.	Typhoid fever occurs between ages of 18 and 35.		

ish patch at the tip. In severe cases the entire mouth and tongue may be covered with brownish incrustations. As convalescence approaches, the tongue becomes moist, first about the edges and then along the dorsum, and gradually returns to its natural condition. The lips often crack, and become covered with sordes, which when removed caused them to bleed. In rare instances hemorrhage from the gums occurs. Slight catarrhal inflammation of the fauces and pharynx, with its attendant annoying secretion is usually present during the first week. Later the secretion ceases, and owing to changes in the salivary glands, the mouth and throat become dry, and swallowing is difficult. In children difficult deglutition is occasionally due to pharyngeal hyperæsthesia, the fluids being rejected through the nostrils. Parotitis may appear in severe cases during the third or fourth week, and is of unfavorable omen. The enlargement commonly suppurates and is then very often fatal. *Thirst* is generally present, and in a large proportion of cases is excessive.

The appetite is impaired from the start, and as the tongue becomes dry is wholly lost. Nausea and vomiting are not uncommon during the first week. Usually, however, they appear during the second week, and in severe cases may be associated with more or less epigastric tenderness. The matters vomited usually consist of a greenish fluid. When vomiting comes on after the end of the second week, either it is due to gastric catarrh or appears as the first sign of peritonitis.

Diarrhea is one of the most common attendants of typhoid fever. It may be present during the prodromic period, or not appear until the third or fourth week. The second week is the usual time for its appearance. The average number of evacuations is three or four in twenty-four hours. At times from twelve to fifteen movements may take place per day. A mild diarrhea is a favorable rather than an unfavorable symptom. Generally the urgency of the diarrhea bears no constant relation to the extent of the intestinal lesions. During the first week the stools are thin and brownish, and have an alkaline reaction. Later they are of a yellowish-green color, assume the peculiar typhoid appearance, and contain micrococci and other bacterial forms. From this time they are known as "pea-soup discharges."

Gurgling and *tenderness* in the right iliac fossa, are often elicited on palpation. Spontaneous pain is frequently complained of. The abdominal pain and tenderness, which are generally present after the sixth day, are due to local morbid processes, and hence increase as the disease progresses. While examining the abdomen at this time to ascertain the amount of tenderness, all pressure should be made with the palm of the hand, never with the ends of the fingers. Usually the expression of the countenance will enable you to determine whether you are or are not by the pressure, causing pain, long before the patient makes an audible complaint.

Intestinal hemorrhage occurs in about five per cent of the cases, and varies in quantity from a mere trace of blood to one or more quarts. If the blood is promptly discharged, it is of a bright red color, owing to the alkaline condition of the intestinal contents, and is either syrupy or loosely clotted. If it be retained for some time in the intestine (concealed hemorrhage) it assumes a tarry consistency, and is of an olive-green or brown color. The slight hemorrhages which occur prior to the latter part of the second week, arise from the ruptured capillaries of the mucous membrane. The more profuse hemorrhages of the third and following weeks are due to the separation of sloughs, or to the destructive action of progressive ulceration. The usual time for the occurrence of extensive intestinal hemorrhages is in the latter part of the second and during the third week. In the majority of instances they occur in severe cases, and especially such as are attended by profuse diarrhea. These hemorrhages are usually announced by an abrupt but transitory fall in temperature, and by the speedily ensuing symptoms of collapse.

Perforation of the intestine occurs mostly between the third and fifth week, and is more frequent among men than women. The perforation is in the majority of instances found in the lower portion of the ileum. Usually, it presents a round opening in the peritoneal covering, varying in size from a pin's head to a split pea. It extends inwards in the shape of an inverted funnel, and corresponds either to an ulcerated Peyer's patch, or, less frequently, to a solitary gland. The margins of the opening usually present a "punched-out" appearance. At the time of the perforation, the patient frequently experiences a sudden pain, first in the right iliac fossa but soon extending over the entire

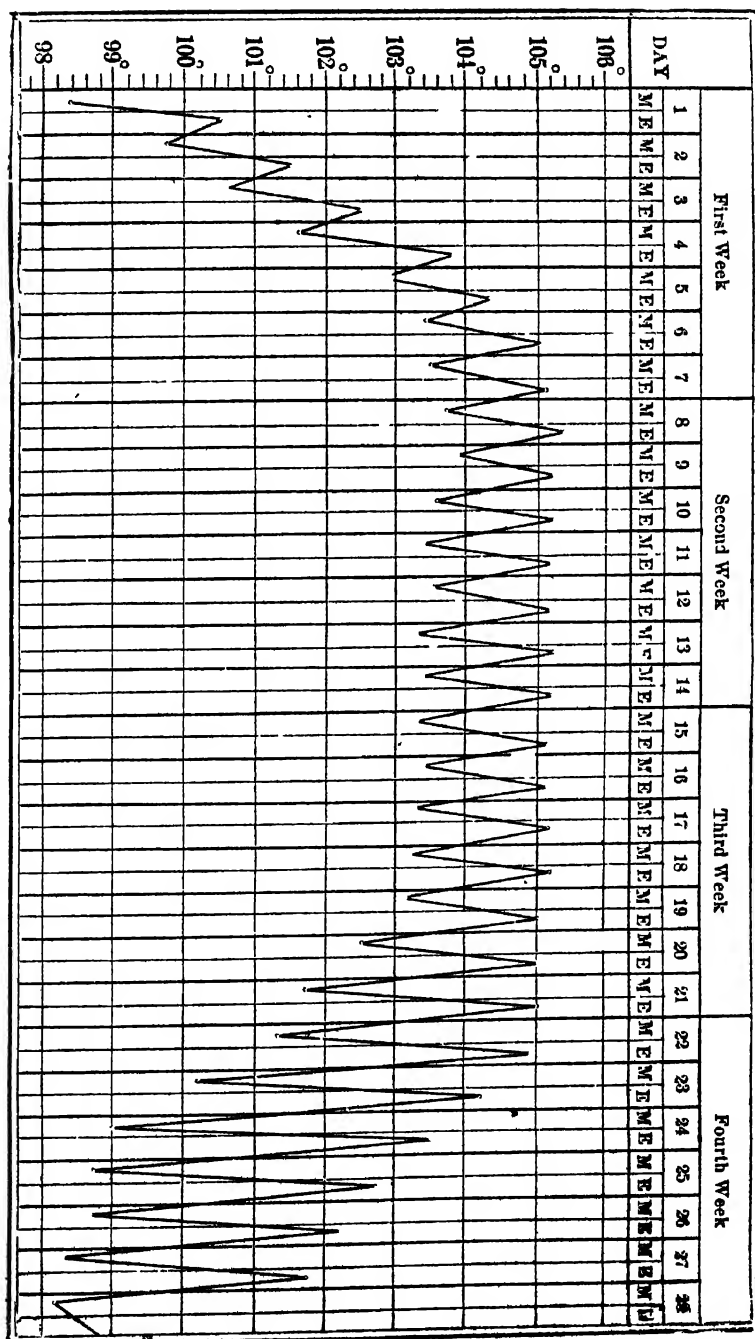
abdomen. Following this a state of collapse supervenes. The abdomen becomes rapidly tympanitic, the temperature falls, the pulse is quick and feeble, the countenance anxious and sunken. Nausea and vomiting are marked, and there is coldness and blueness of the extremities. Occasionally in severe cases the patient dies during the collapse. Usually, however, he survives the shock, the temperature rises, and a fatal termination does not occur until the third or fourth day. In rare instances recovery may take place.

Tympanites is a very common symptom, existing to some extent in all cases. It makes its appearance about the end of the first or the beginning of the second week, and remains until convalescence is fully established. The distention steadily increases as the fever advances, and attains its maximum in the latter half of the third or in the fourth week. It is due partly to the excessive development of gas, and partly to deficient expulsive power. After its appearance a gurgling sound may be produced by pressing firmly over the right iliac fossa. Tympanites is in part a measure of the extent of the intestinal mischief, and is always an important diagnostic sign. And, generally, it may be stated, that in typhoid fever, no matter how favorable the other symptoms appear, so long as the abdomen remains tympanitic, the patient is in more or less danger.

The Spleen.—*Enlargement of the spleen*, with tenderness, is a very prominent symptom. It appears early in the disease, increases uniformly during the second week, and then gradually diminishes. It is greatest in individuals under thirty years of age, and at the height of the disease may be three times the natural size of the organ.

The Temperature.—In well-marked uncomplicated cases of this disease, the course of the fever may be divided into four periods, each of which is characterized by a special thermometric curve. The average duration of each of these periods is seven days. Occasionally the typical course of the fever is disturbed, and in consequence the duration of the periods may be shortened to five days or lengthened to eight or nine days.

The typical thermometric variations of a severe case of typhoid fever are well outlined in Fig. 10, and those of a mild case are represented in Fig. 11. From the first day of the development



Temperature Cycle in Typhoid Fever.—Severe Form.—(After Murchison).

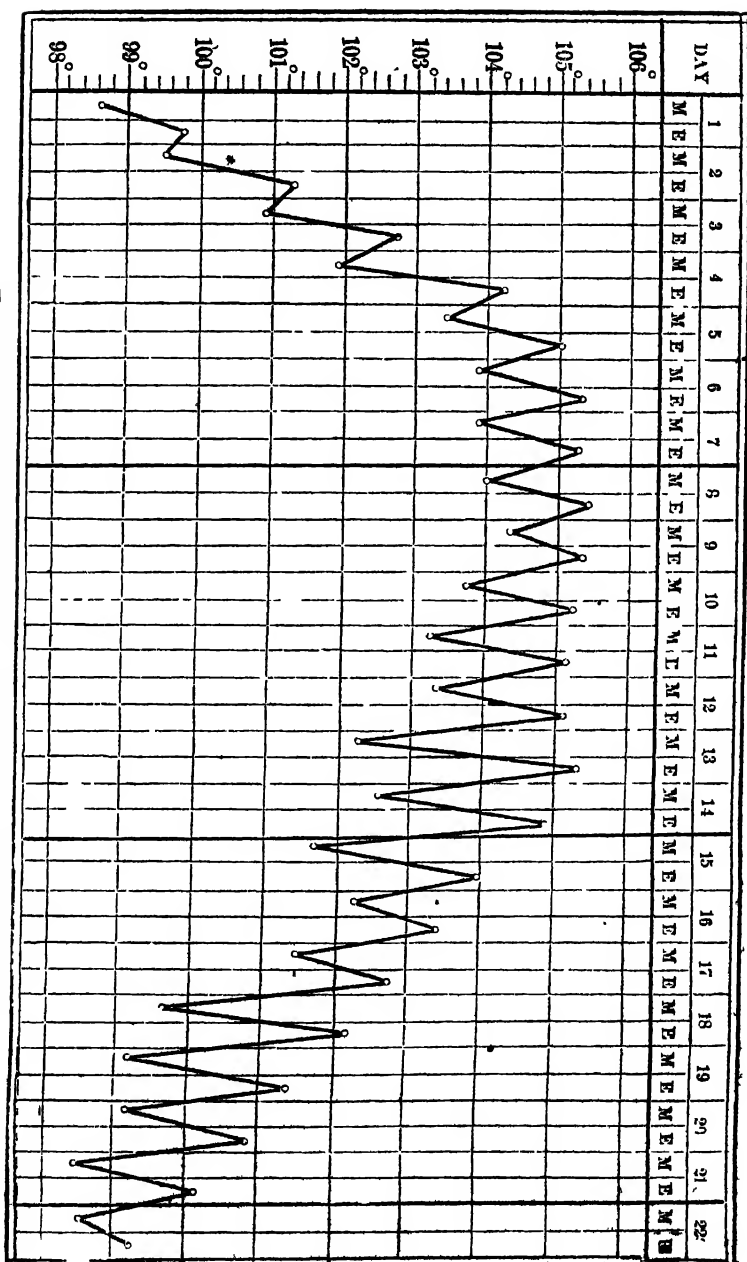
of the fever, and through the first period, the pyrogenic course of the disease is rapid and progressive. The temperature for three or four days rises about 1.8° Fahr. to 2.7° Fahr. from each morning till evening, and falls again from the evening to the following morning 0.9° Fahr. to 1.3° Fahr. Between noon and evening of the fourth or fifth day, the maximal height, 104° to 106° , is reached. The daily rise begins about noon, and is completed before 11 P.M., usually between 4 and 7 P. M. The fall occurs between midnight and 10 A. M., oftener between 6 and 9 A. M. Two temperature observations should be taken daily; one about 8 A. M., and the other about 9 P. M.

In the second half of the first week, and the first half of the second week, the course of the temperature is quite uniform, and the fever is described as continuous. Towards the close of the week, the evening rise often falls a little, and the morning remissions become a trifle more marked. All irregularities in the second week, should be viewed with suspicion. A severe course of the disease may be predicted, when the morning temperatures remain stationary at 103° Fahr., and the evening ones above 104.9° Fahr., and when the temperature does not moderate before the twelfth day. Recovery rarely takes place after a morning temperature exceeding 104.9° Fahr., or an evening temperature exceeding 107.2° Fahr. If the morning temperature exceeds 105.8° Fahr. death is almost certain.

In the third week, the morning remission becomes marked, and with it the temperature falls, although the evening exacerbations may reach the same degree as in the week preceding. The change of the fever from the continuous to the remittent form is usually gradual, occasionally it is sudden, and is then announced by a high evening temperature followed by a decided morning remission. By the end of the third week the morning temperature during the remission, will be two or three degrees lower than during the second week. The surest course towards convalescence is mapped out by increased morning remissions succeeded by milder evening exacerbations.

In the fourth week, the fever changes from the remittent to the intermittent type. The morning temperature is each day lower, and the evening exacerbation less decided (Fig. 11), so that frequently by the end of the week the normal standard is reached. In severe cases a striking rise of 0.9° Fahr., or more,

FIG. 11.



Temperature Cycle in Typhoid Fever.—Mild Form.—(After Wunderlich).

about the twenty-fifth day, happening in the middle of a well-marked remission is a not uncommon occurrence.

Convalescence may be said to be established when the thermometer shows absence of fever for two successive evenings. Frequently during this period the temperature falls to 96.8° Fahr. or 97.78 Fahr. in the morning, and under 98.6° Fahr. in the evening. Relapses are to be dreaded if elevations of temperature above the normal occur eight days after the beginning of convalescence (Fig. 12).

The Pulse is increased in frequency in proportion to the rise in temperature. During the first week it becomes more and more frequent, and at its close may reach 100 or 110 per minute. Throughout the second week it remains at about the same height. In the third and fourth weeks it may either gradually diminish in frequency or run as high as 120 or 140. Accidental causes, such as simply lifting the patient in bed, may increase the pulse twenty or thirty beats per minute. A pulse which, without special cause, remains for five or six consecutive days above 120 per minute, is a bad omen, and usually indicates the commencement of a paralysis of the heart.

In the early stages the pulse is full and frequent; later it becomes soft, compressible and dicrotic, and in the advanced stages it may be small, undulating, irregular or uncountable. After the second week, should it any time become irregular and intermitting, the heart's impulse imperceptible, and the first sound inaudible, a fatal issue may be anticipated. Marked coldness of the hands and feet, occurring while the internal temperature is high, is an important sign of impending danger from failure of the heart. Collapse which occurs in consequence of a sudden fall of temperature is a not unfavorable indication.

The Respirations rise with the pulse. Frequently there is *bronchitis*, with shallow, and rather rapid breathing, with some sonorous rales over the chest. The peculiar character of these rales, which give a *dry, ringing sound*, often enables you to make the diagnosis of typhoid fever positive. *Lobar pneumonia* is a common complication, especially in the last part of the second, and in the third week.

Hypostasis and pulmonary oedema may occur any time after the second week, as a result of the enfeeblement of the circulation. Acute *miliary tuberculosis* is an occasional sequel.

The Cutaneous Surface.—In severe cases by the second week the countenance has a pale, livid, muddy appearance, and circumscribed rose-colored spots are formed over one or both cheek-bones. Sometime between the seventh and the fourteenth day from the beginning of the fever (the patient usually taking to his bed on the fifth day), that characteristic symptom of typhoid fever—the *eruption*—makes its appearance. It is occasionally preceded by a faint scarlet rash, and is found mostly upon the abdomen and lower part of the chest, between the nipple and the umbilicus, especially on the right hypochondrium over the articulation of the cartilage of the eighth rib. It consists of small, slightly elevated, round or oval, deble, rose-colored spots, which vary in diameter from a point to a line and a half. The spots are developed in successive crops, and each spot remains visible three days. They resemble flea-bites, although paler in color. They disappear upon slight pressure, and return immediately when the pressure is removed. They are usually few in number, run their course without change, and disappear leaving no trace upon the skin. They give no feeling of hardness to the finger passed over them, and are not seen after death. The duration of the eruption is three, eight, or ten days. It disappears before convalescence is established, but may re-appear in true relapses. It is most marked between the ages of ten and thirty. Jenner found it present in 148 out of 152 cases.

Late in the disease, minute transparent vesicles, called *sudamina*, frequently appear over the surface of the body. Boils and abscesses are very often met with. *Bed-sores*, defined as gangrene resulting from pressure, frequently form over the sacrum and trochanters, and at times over the elbows, heels and occiput. They prove troublesome and often serious complications of typhoid fever. The *hair* falls during convalescence. All through the disease the skin emits a *musty odor*, which is held by some to be pathognomonic. •

Emaciation appears early and is progressive. So general is it that even after convalescence is established a long time often elapses before the patient regains his normal healthy appearance. Occasionally after a severe attack of the fever, the system undergoes a change, and patients who have heretofore been lean become fat, and *vice versa*.

The Urine is diminished in quantity during the first two weeks of the fever, and has a typhoid odor, like the body. It is then darker in color and has a specific gravity of from 1020 to 1030. In the advanced stage of the fever, and especially during convalescence, it is pale, copious, foaming, and of low specific gravity. The amount of urea excreted is increased about one-fifth, and is greatest when the temperature is highest. The chlorides are greatly diminished during the fever, but re-appear as convalescence is established. Albumen appears in urine in nearly one-third of the cases. When present the amount is small, and of short duration. It rarely appears earlier than the middle of the third week, but when it does appear it is apt to be associated with grave cerebral symptoms. Renal epithelium and tube-casts are frequently discovered along with the albumen. Late in the disease the urine often contains a large amount of phosphates. Catheterism is frequently rendered necessary, after the second week, on account of urinary retention. Vesical catarrh not rarely occurs during convalescence.

The Nervous System.—*Headache* is one of the earliest and most constant symptoms of typhoid fever. It is usually described as a dull, heavy pain, and is commonly confined to the forehead and temples; sometimes it extends over the whole head. It is most severe during the first week, and ceases spontaneously about the tenth day. Associated with it, there are slight vertigo, intolerance of light, and pain in the back and extremities.

Somnolence usually appears sometime during the second week. At first the drowsiness is only slight, but later, especially in severe cases, it becomes more and more profound. Frequently it is interrupted by delirium. In children somnolence is a frequent and valuable diagnostic sign.

At any time the occurrence of hysterical manifestations should render the prognosis guarded as to coming nervous symptoms.

Delirium is commonly present. It is often slight and may occur chiefly at night time, or between sleeping and awaking. It rarely appears before the middle of the second week, though exceptionally maniacal delirium is the first symptom leading to the supposition that the patient is ill. The characteristic form of the delirium is the "low muttering." Sometimes, however,

it is active and noisy from the start, so as to render physical restraint necessary. The mind is dull and stupid.

Muscular prostration is noticeable in all severe cases from the beginning of the fever and increases with its progress. It is usually most marked during the second or third week. Retention of urine and involuntary evacuations from the bowels, when occurring early in cases in which the prostration is extreme, are unfavorable symptoms. Vesical paralysis is a not uncommon sequel.

Muscular tremors, especially trembling of the hands, tongue, and lips, are oftenest met with in old and feeble persons, and in those who are addicted to the use of spirits. In the advanced stages of severe cases, subsultus tendinum, carphologia, and hiccough are observed. General convulsions are rare, except in very young children. Paraplegia occasionally appears either during the course of the fever, or after the commencement of convalescence.

The Special Senses.—*Epistaxis* is a common symptom and is apt to occur early in the disease.

Deafness is most marked about the middle period of the fever and usually affects both ears. One-sided deafness is generally caused by ulceration of the mucous lining of the Eustachian tube, or by suppuration of the middle ear. In severe cases, ringing and humming in the ears are complained of during the early days of the fever. At the middle of the second week, about the time the delirium appears, the *pupils* will be found abnormally dilated. In rare instances paralysis of accommodation occurs as a sequel.

Hyperæsthesia of the surface of the body is common in females and in children. It is most marked over the abdomen and lower extremities, and is generally associated with tenderness along the spine.

Duration.—The average duration of typhoid fever is from three to four weeks. In a typical case the length of the stage of invasion varies from one to five days. The stage of glandular enlargement continues until the twelfth or fourteenth day, and the ulcerative stage extends from the fourteenth day to sometime between the twenty-first and twenty-eighth days. The

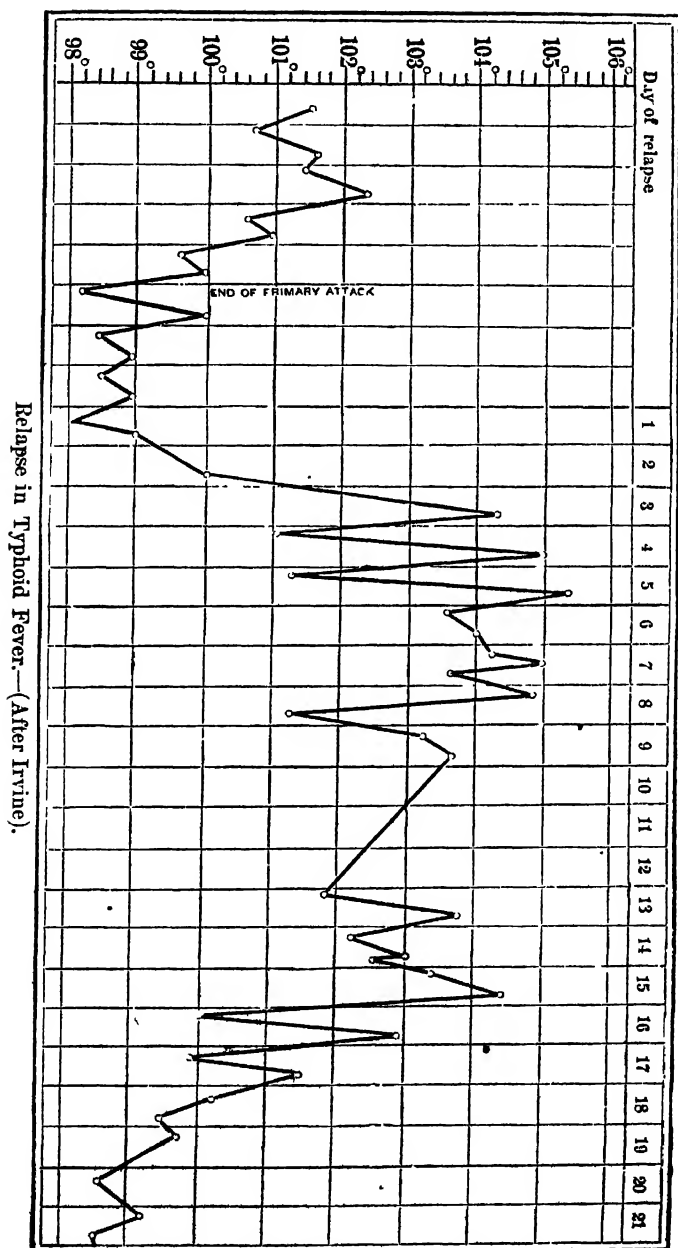
stage of convalescence has an average length of from one to two weeks. The period of greatest danger is about the close of the third week. Death seldom occurs earlier than the fourteenth day.

Relapses.—A relapse has been defined as a second evolution of the specific febrile process after the establishment of convalescence, and is due to re-infection by the specific cause, either from a new and second infection from the source of the original poison, or, which appears more probable, from resorption of the poison thrown off in the *fæces*. It is usually milder and of shorter duration than a primary attack. Most commonly it occurs singly, though occasionally a second or even a third may take place. It may be ushered in by chilliness or rigors, or declare itself, after a period of interval of from one to five days, by a sudden recurrence of febrile symptoms. The temperature bounds at once to 103° Fahr. or 104° Fahr. and may be either continuous or attended by remissions (Fig. 12). The eruption reappears, frequently as early as the fourth day, the spleen again enlarges, the intestinal and abdominal symptoms return, and the majority of the characteristic symptoms of the primary attack are reproduced. The fever attains its maximum about the evening of the fifth day, and a critical fall takes place about the eighth or ninth day. On the tenth day a decided rise again occurs. From this time the morning remissions become more and more pronounced, and the temperature returns in a zigzag manner to the normal degree with convalescence. A fatal termination is a rare occurrence unless perforation takes place. The intestinal lesions of a relapse are usually less numerous than in a primary attack, and the ulceration is higher up.

“After fevers” or “recrudescences of fever” which are generally dependent upon unhealed ulcers, and arise from dietetic errors or over-exertion, are entirely different from true relapses, and last only a few days.

Morbid Anatomy.—The anatomical lesions of typhoid fever are in many instances so peculiar and characteristic that at an autopsy, an experienced observer can, without previous knowledge of the history and symptoms of the case examined, make a positive diagnosis.

Early in the disease, as soon as the characteristic symptoms



appear, the *blood* becomes darker in color and gradually loses its fibrin. Later it becomes thin and watery, and the number of white globules is largely increased. The *spleen* becomes enlarged, softened and pigmented. The enlargement begins early, and attains its acme at the beginning of the third week. It then gradually diminishes, and reaches the normal during convalescence. On section the organ is found to be of a brownish-red, almost black color. In the early stages it is of moderate consistence, but later it is a soft, friable, jelly-like mass. Near the close of the disease infarctions are often met with, and in rare instances, spontaneous rupture occurs. According to Gerhardt, in cases in which relapse takes place, the spleen frequently remains enlarged during the apyrexial period between the primary attack and the relapse. The *liver* is in most cases normal in appearance; occasionally it is softened, and the cells are more or less granular and fatty. Nodules, consisting of lymphoid cells are at times found along the course of the small veins. The amount of bile is generally diminished, and in the later stages it is thin and almost colorless.

The Kidneys.—Degenerative changes in the kidneys are usually associated with albuminuria. When present they affect first the cortical and later the medullary portion of the organ. Infarctions are sometimes observed.

The heart undergoes parenchymatous degeneration in proportion to the intensity and duration of the febrile movement. In most instances it becomes soft, flabby, friable, and of a pale gray or "faded-leaf" color. On microscopical examination, the muscular fibres will be found to have undergone granular degeneration, sometimes to such an extent as to efface the striations. The feebleness of the heart's action, especially in severe cases, is always proportionate to the extent of this degeneration.

The Lungs.—The dependent portions of the lungs frequently present the condition of hypostasis. When the hypostasis is complete, the lung tissue is of a dark brown or black color, and is then in the condition termed *splenization*. The bronchial glands are at times enlarged, and evidences of pneumonia are oftentimes present. Pulmonary cedema is frequently observed. In the bronchial tubes—especially the larger ones—evidences of catarrhal inflammation are almost always found. The larynx is

frequently the seat of catarrhal inflammation; less frequently it is the seat of more or less extensive ulceration. Dangerous hemorrhages sometimes take place from these well-designated "typhoid ulcers of the larynx." At times the ulceration involves the epiglottis, and it may extend upward and outward to the Eustachian tube.

The Nervous System.—The brain and nervous system present no known characteristic lesion, although not infrequently adhesions of the dura mater are found early in the disease, while oedema of the pia mater and brain structure occur later in its course.

The Muscles.—The voluntary muscles may be the seat of either granular or waxy degeneration. The *granular* degeneration is more frequent, and corresponds to ordinary fatty degeneration. In *waxy* degeneration the muscle substance is converted into a waxy, shining mass. Muscular degeneration is most marked in the second, third and fourth weeks. The abdominal rectus, the adductors of the thigh, the pectorales, the diaphragm and the tongue are oftenest implicated, and always to the greatest extent. The want of muscular power which appears at the height of the disease is due in part to disturbances of the nervous system and in part to muscular changes; but the excessive loss of power during convalescence is almost entirely due to these degenerative changes of muscular tissue.

Cadaveric rigidity is usually marked, and long lasting.

The Digestive Tract.—Early in the disease the salivary glands and pancreas become hard and undergo granular degeneration. At first they have the consistence of cartilage and are of a brown-yellow color. Later the hardness diminishes, and they present a reddish appearance. After the third week ulcerative changes, may, in rare instances, be found in the pharynx, and at the cardiac extremity of the œsophagus. The stomach is at times hyperæmic, and may be the seat of extensive degenerative glandular changes.

The Intestinal Lesions.—The principal lesions of the intestinal canal involve the agminate and solitary glands of the ileum and are characteristic of the disease. The course of the pathological changes which result in these lesions, may, for the convenience of study, be divided into four stages corresponding to the four

periods of the fever. In the first week—the *stage of catarrhal inflammation and of medullary infiltration*—the mucous membrane, especially that surrounding the Peyerian patches, becomes hyperæmic and swollen. The agminate and solitary glands become infiltrated with lymphoid cells, and the patches are thickened, hardened and elevated from one to three lines above the surrounding membrane. Their surface assumes a dark reddish color; forming what is known as the “shaven-beard appearance.” These changes are generally well marked as early as the second day, but are not fully developed until the end of the first week.

In the second week—the *stage of softening and necrosis*—the mucous membrane becomes less hyperæmic, but the agminate and solitary glands become more elevated and infiltrated. The follicles become swollen in all directions, from the excessive development of cell elements. As a result of the pressure of these cells upon the capillary vessels which furnish nutrition to the glandular structure, the glands become anæmic and degenerative changes occur. In some of the glands by the middle of the second week the new elements undergo disintegration and absorption, and the process ends in resolution. In others the individual follicles rupture, and discharge their contents into the intestinal canal. More frequently the swollen patches undergo partial or complete necrosis, and yellowish-brown or greenish sloughs are formed.

In the third week—the *stage of ulceration*—the necrotic tissue separates, leaving a typhoid ulcer with sharp everted and overhanging edges. The size and depth of the ulcer correspond to the area of the necrosed tissue. They are elliptical when an entire patch is necrotic, and small and round when the infiltrated solitary glands are necrosed. Usually by the end of the second week the sloughs are all detached.

In the fourth week—the *stage of cicatrization*—the swollen edges of the ulcers gradually subside, and the surface becomes covered with granulation tissue, which is transformed into connective tissue, and ultimately covered with a layer of epithelium. The gland structure is not regenerated. The resulting scar is slightly depressed, firm, less vascular than the surrounding mucous membrane, often more or less strongly pigmented, and can be recognized after the lapse of years. It never causes puckering, and never gives rise to diminution in the calibre of the in-

testine. Not infrequently the process of healing does not pursue this regular course and terminate thus favorably. In some instances while one portion of the ulcer is undergoing cicatrization, in another part the process of ulceration may be extending. Such long-continued ulceration may prolong convalescence, and occasionally cause death, either from exhaustion or by perforation.

The Mesenteric Glands undergo changes analogous to those which take place in the intestinal glands. In some cases all the glands are affected, but usually the changes are confined to those which correspond to the diseased portion of the intestine. They are first congested and then enlarged in consequence of cellular hyperplasia. The maximum of enlargement is reached about the middle of the second or beginning of the third week. The size attained varies from that of a chestnut to a small hen's egg.

In the retrogression some of the glands simply shrink and return to the normal state. Others undergo softening and absorption, and leave a fibrous cicatrix. Still others of large size are only incompletely absorbed, the cheesy matter which is left undergoing, in process of time, calcareous degeneration. And a few after softening, form pseudo-abscesses, which may burst into the peritoneal cavity and cause general peritonitis.

A calcareous state of the mesenteric glands, and pigmented cicatrices of the solitary and agminate glands, are almost positive autopsic symptoms of a previous severe case of typhoid fever.

Differential Diagnosis.—The diagnosis of well-marked cases of typhoid fever is usually attended with but little difficulty. The presence of the febrile movement with nocturnal exacerbations and morning remissions, and the appearance of frontal headache, epistaxis, bronchial cough with sonorous rales, and diarrhea, during the first week, are sufficiently suggestive of the disease. The progressive enlargement of the spleen, the tenderness over the region of the ileo-cæcal valve, and the tympanites are also diagnostic. Equally characteristic are the rose-colored spots, the pea-soup or ochre-colored dejections, and the muttering delirium. In mild, abortive and irregular types it is always difficult and oftentimes impossible to form an accurate diagnosis.

The diseases with which typhoid fever is most liable to be con-

founded are, simple continued fever, simple remittent fever, typho-malarial fever, typhus fever, relapsing fever, acute tuberculosis, pneumonia, influenza, gastro-enteritis and trichiniasis.

Simple continued fever as distinguished from typhoid fever is characterized by the abruptness of the rise and fall of temperature, by the absence of eruption and of abdominal symptoms, and by its short duration.

The rules for differentiating *simple remittent fever* (p. 84) and *typho-malarial fever* (p. 118), from typhoid fever, have already been given in the lectures upon those diseases, and as they are familiar to you, their repetition is unnecessary.

The leading phenomena of *typhus fever*, *relapsing fever*, and *typhoid fever*, may be contrasted, for the purpose of establishing their clinical distinction, according to the following tabular arrangement:

TYPHUS FEVER.	TYPHOID FEVER.	RELAPSING FEVER.
An epidemic disease.	An endemic disease.	An epidemic disease.
Highly contagious.	Non-contagious.	Contagious.
Onset sudden.	Onset insidious.	Onset sudden.
Course continuous.	Course continuous.	Course broken by a distinct apyrexial period.
Duration about 14 days.	Duration 3 to 4 weeks.	Duration of primary paroxysm 5 to 7 days, of intermission 4 to 7 days; and of relapse 3 days.
Defervescence critical or by rapid lysis.	Defervescence by prolonged lysis.	Terminates abruptly by crisis.
Relapses rare.	Relapses occasionally.	Relapses constant.
Countenance, dusky-red.	Countenance, pale or purplish-red. Flush circumscribed and confined to cheeks.	Countenance flushed.
Conjunctivæ deeply injected; pupils contracted.	Pupils often dilated.	Conjunctivæ slightly injected; pupils natural.

TYPHUS FEVER.	TYPHOID FEVER.	RELAPSING FEVER.
No epistaxis.	Epistaxis common.	Epistaxis occasionally, especially at crisis.
Skin has a pungent heat. Sometimes emits ammoniacal odor.	Skin sometimes bathed in acid perspiration. Musty odor.	Skin is hot. Profuse sweat at the crisis.
<i>Mulberry-rash.</i> Eruption deep red, copious, appears all over the body.	<i>"Rose-rash."</i> Eruption light red, thinly scattered, confined to chest and abdomen.	No defined rash. Sometimes a rose eruption resembling roseola.
Appears on 5th or 6th day. Each spot remains until the close of the disease.	Appears on 7th to 9th day. Each spot lasts 3 days.	.
Temperature rises rapidly, reaches 104° or 105° at end of 2d day.	Temperature rises 2° from morning to evening and falls 1° from evening to morning.	Temperature rises rapidly to 104° or even 109°, within 24 hours.
Falls rapidly after the 12th or 14th day.	Reaches 104° on morning of 4th day. Returns gradually to the normal standard in 4th week.	Falls suddenly during the remission. Rises rapidly during relapse to 106° or 107°.
Pulse, soft, 100 to 140.	Pulse 100 to 140.	Pulse, small, 140 to 160.
Delirium and stupor, early and prominent.	Cerebral symptoms approach gradually, and last longer.	Mind usually clear.
Abdominal symptoms absent.	Abdominal symptoms prominent.	Pain and tenderness in epigastrium.
Constipation.	Diarrhea, tympanites and gurgling.	Constipation.
No tympanites.	Tenderness in right iliac fossa.	Sometimes diarrhea at crisis.
Emaciation slight; greater prostration.	Emaciation great.	Emaciation not marked.
Pneumonia and bronchitis in finer tubes.	Bronchitis and pleuritis.	Bronchitis common.
Death often within 10 days.	Death rarely within 14 days, usually in or after 3d week. Mortality, 20 per cent.	A fatal termination is rare.
Mortality, 15 to 50 per cent.		
No constant lesions.	Constant lesions of ileum and mesenteric glands.	Lesions not characteristic.

A variety recognized by Niemeyer as *gastric fever* is occasionally mistaken for typhoid fever although it oftener simulates typho-malarial fever. It commences with headache, malaise and anorexia, followed by a slight chill, with marked gastric irritability, nausea, vomiting and constipation. There is marked epigastric tenderness, and a peculiar *sweetish* or *garlic-like odor to the breath*, which is believed to be pathognomonic. The temperature rises at first to 100° Fahr. but falls below the normal as the disease advances. The pulse beats from 60 to 70 per minute. This variety of fever occurs more in women than in men, and oftener after the middle period of life. It differs from typhoid fever in that it has neither tympanites, diarrhea, delirium, subsultus tendinum, eruption, iliac tenderness, nor sordes. Its mortality is higher than that of typhoid; and double vision or total loss of sight is considered a grave symptom.

Acute tuberculosis is attended by many symptoms of typhoid fever. Its fever rise is, however, more sudden, for early in the disease, the temperature reaches 106° Fahr. or 107° Fahr. The rose-colored spots of typhoid are never present, and diarrhea rarely exists. And, generally, the abdomen, which is tympanitic in typhoid fever is flat or even scaphoid in acute tuberculosis.

Influenza which at times closely resembles typhoid fever, may be differentiated by the short duration of the attack, the temperature range, and the general absence of the abdominal symptoms of typhoid.

Pneumonia with typhoid symptoms—*typhoid pneumonia*—may be confounded with typhoid fever. In the former, however, there is no eruption, and the temperature curve is atypical. The typhoid symptoms appear usually during the second stage of the pneumonic inflammation, and are either preceded or attended by cough, and the characteristic expectoration. Physical exploration of the chest if instituted before the typhoid state supervenes will elicit positive evidence of pneumonic consolidation.

In *gastro-enteritis*, which may be confounded with typhoid fever, the febrile movement is usually symptomatic, and preceded by diarrhea and vomiting. There is neither eruption, nor enlargement of the spleen. The temperature curve is atypical, and the disease is of a relatively shorter duration.

Trichiniasis occasionally closely resembles typhoid fever. The

differential diagnosis rests chiefly upon the existence of intense muscular pains and oedema of the eyelids; as also on the absence of epistaxis, the rose spots and enlargement of the spleen. A microscopical examination of the muscular tissue will render the diagnosis positive.

Prognosis.—Typhoid fever is best endured by lean and muscular individuals. The prognosis is always bad in fat and gouty subjects, and in persons over forty years of age. It is especially unfavorable in the puerperal state, and when occurring among the intemperate.

Death may occur at any period of the disease, but in uncomplicated cases it rarely occurs earlier than the third week. It may take place by asthenia at the end of the third or in the fourth week. It may occur by coma at the end of the second or early in the third week. Or it may follow sudden collapse after intestinal hemorrhage, perforation, or sudden heart failure, any time after the second week. Liebermeister says that in all typhoid patients who die without complications, the immediate cause of death lies in the fever and its consequences. The patients die either from *weakness of the heart*, caused by the rise of temperature, or from *paralysis of the brain*. Abortive cases, those in which the pathological processes of the ileum do not go on to sloughing, terminate abruptly by crisis about the fourteenth day. Typical cases always terminate by prolonged lysis, defervescence being completed by the twenty-first or twenty-eighth day. A second attack of typhoid fever is usually milder than the first.

The daily fluctuations in temperature are of great importance in making the prognosis. As a rule the greater the daily fluctuations the more favorable the prognosis. But a sudden rise or fall in temperature at any period of the fever is of bad omen. Usually the more sudden the appearance of the disease, and the more rapid the temperature rise, the milder the attack. A continuously high fever is always more disastrous to the system than one marked by morning remissions. The temperature at the end of the first week is a guide for the coming weeks. A moderate elevation of temperature from 103° Fahr. to 105° Fahr. at this time indicates that the disease will probably run a favorable course. After the first week a temperature above 105° Fahr., if prolonged, renders the prognosis unfavorable. Slight

decline accompanied by great fluctuation of temperature, during the third week, is a bad symptom.

In giving the percentage of over four hundred cases observed in the hospital at Basle, Wilson writes, that of those in whom the axillary temperature did not attain 104° Fahr. 9.6 per cent died. Of those that reached or exceeded 104° Fahr. 29.1 per cent died. Of those that rose to or beyond 105° Fahr. over 50 per cent died. And of those that exceeded 107° Fahr. nearly all died.

The state of the pulse is an important element in prognosis. A full and regular pulse of 110 or 115 per minute, with a good heart impulse and a distinct first sound, renders the prognosis favorable, even if the temperature is high. While a pulse of 120 or 130, with a feeble impulse and an indistinct first sound, vitiates the prognosis. A sudden fall of the pulse from any cause is an unfavorable symptom; a sudden quickening is also an unfavorable indication as it shows extensive cardiac failure. Cardiac weakness favors the formation of blood clots in the heart cavities, which breaking up may lead to embolism. Venous thrombosis does not vitiate the prognosis, as it usually ends in recovery.

In cases in which the *cerebral symptoms* are marked and severe, the prognosis should be guarded. Cerebral oedema, announced by an enfeebling of the mental powers and a tendency to stupor, may appear as a complication during the third week, and always renders the prognosis grave. Cases characterized by persistent delirium usually terminate fatally.

Intestinal hemorrhage, if slight, and occurring before the twelfth day, is regarded by some as beneficial, but if copious and occurring after the twelfth day, it is an unfavorable symptom. *Perforation*, which is more frequent amongst men than women, is a dangerous and usually fatal complication.

Laryngitis may in protracted cases of this fever, by suddenly giving rise to oedema of the glottis, endanger life. *Capillary bronchitis* with its sub-crepitant rales, great dyspnoea and stringy expectoration, coming on after the second or third week, if at all extensive, is an unfavorable indication. *Oedema* of the lungs, as the result of failure of heart power, may appear suddenly, any time after the third week, and is of grave import. An extensive *pneumonia*—usually catarrhal—accompanied by irregular variations in temperature, and developing any time after the third

week, is especially unfavorable. The chances of recovery may however, be good, notwithstanding the occurrence of pneumonitis, provided the inflammation is limited to one lung.

Acute gastric catarrh, due to dietetic errors, and occurring after the fourth week, if at all severe, is an unfortunate complication, and lessens the chances for recovery.

Cellulitis frequently complicates convalescence, and may cause death. *Bed-sores* may cause death, either from exhaustion, or from septic poisoning. Pregnancy and the puerperal state always unfavorably influence the prognosis. And individuals with either pulmonary phthisis, or diabetes, run great danger, when taken sick with typhoid fever.

LECTURE XII.

Typhoid Fever.—(CONTINUED).

TREATMENT.

I shall to-day direct your attention to the management of typhoid fever.

Before entering on the consideration of therapeutic measures, it may however, be well to say a few words concerning preventive treatment.

Prophylaxis.—The essential point in the prevention of the spread of typhoid fever, I would have you remember, consists in the proper treatment of the dejections of the sick. So successfully can the spread of the morbid agent be prevented, that next to conducting your patient to a successful convalescence, it will be your highest duty to see to it that no new cases of fever arise by either direct or indirect infection from any patient under your care. When the disease appears in your locality, you should, if possible, find out the cause of the infection, remove all those surroundings which favor the reproduction of the poison, and take immediate steps to correct whatever conditions lead to the pollution of drinking water or of the air.

In order to destroy the germ, which is contained in the intestinal discharges, the dejections, before being thrown out, should be promptly and thoroughly disinfected. For this purpose a solution of chloride of zinc, 20 per cent, or a solution of carbolic acid, 5 per cent, or what is preferable, Platt's chlorides may be used. Or after the evacuations have been received into a porcelain bed-pan, the bottom of which has previously been covered with a thin layer of ferric sulphate, a quantity of crude muriatic acid, equal to one-third or one-half the amount of the

discharge should be poured over the fecal mass. In rural districts—where the disease most abounds—the disinfected discharges should be emptied into trenches dug anew for their reception, and carefully covered up. Care should be taken to locate these trenches a sufficient distance from wells or springs, so that drainage from them may not contaminate the water supply. In cities and in localities where the dejections are usually emptied into the ordinary water-closets or privy-vaults, the closets or vaults should be immediately flushed with some one of the disinfectant solutions already enumerated.

All the patient's body and bed linen, and especially such as have been soiled with the excreta, before being removed from the room (daily), should be thrown into a five per cent solution of carbolic acid, or some other disinfectant, and then immediately washed. Platt's chlorides should be sprinkled on the bed and about the room, and after the death or cure of the patient, charcoal should be burnt in the apartment with sublimed sulphur, and the room closed for twenty-four hours. Before the room is again occupied it should be washed with carbolized water, and freely aired for at least one week.

When the disease is prevailing as an endemic, *Baptisia*, first dil. administered morning and evening, often acts as a preventive by rendering the system less susceptible to the morbid agent.

Principal Remedies.—Typhoid fever being a *self-limited* disease, *it cannot be cut short, after the morbid agent has fully invaded the organism*, by any known method of treatment. In exceptional cases, if you are fortunate enough to be called to a patient *before the poison has fully invaded the organism*—and that is before the appearance of any definite symptoms that will enable you to diagnose typhoid fever—and are still more fortunate to have prescribed *Baptisia* or *Bryonia*, you may perchance assist the case to assume either the mild or abortive type. Otherwise, to use a nautical phrase, you must be content simply to steer the ship, for you can neither shorten nor alter the course of the storm.

Baptisia may be justly considered our sheet anchor in the treatment of typhoid fever during the first week. For it is capable of exciting a fever resembling that of typhoid, and of producing congestion and catarrhal inflammation of the intestinal mucous membrane, with abdominal tenderness and diarrhea, the

pathological condition present during this period. The soft and full, yet quick pulse, the headache and tendency to delirium, the despair of cure, the fetid breath, the soreness all over, and the intolerance of pressure on lying are marked symptoms. It is best indicated in that type which is characterized by extreme depression of vitality. And if administered *early*, it will considerably abate its energy.

Bryonia is an older and more tried remedy than *Baptisia*. It is mainly useful in moderately severe cases, and is characteristically indicated for the symptoms prior to the stage of ulceration. Nervous symptoms do not contra-indicate it, especially if there is mild delirium at night about the affairs of the previous day or business matters. Besides being adapted to the general symptoms of the early stages of the fever, this remedy has a specific action on the bronchial tubes. Sometimes it suffices, unaided, to bring the disease to a favorable termination.

Rhus tox. is adapted to the more intense cases, and corresponds to all stages, but more especially to the period of fully developed intestinal affection. It supersedes *Bryonia* as soon as the characteristic stools appear, and is particularly indicated when the dejections are copious and of a cadaverous odor, when the tongue is brown and parched and presents the red triangular tip, and when the rheumatoid tearing pains in the joints are worse during rest. In whatever stage this remedy is indicated, the functions of vegetative life will be found excited and over-active, while those of animal life will be depressed.

Arsenicum alb. takes the place of *Rhus tox.*, when the latter fails to control the critical evacuations, and a graver erethitic state supervenes. It is especially useful during the second half of the second and during the third week. It is the remedy when the stools are dark in color and offensive, and when bed sores appear early in the disease. Frequent urging to urinate, with burning and scanty discharge is speedily relieved by its administration.

When vegetative and animal life are simultaneously depressed, and in consequence of the excessive prostration the patient lies in a state of stupid apathy and indifference, *Phosphoric acid* is the remedy. At the onset of the disease you will often find it invaluable in arresting the diarrhoea, especially when the discharges

are yellow and watery, and the tongue is pale, moist, and thinly coated. It is an important remedy in mild typhoids attended with dullness of hearing and great nervous prostration. *Lycopodium* preceded by a few doses of *Calcareo carb.* is said to ameliorate the symptoms, when the eruption is delayed, and there are muttering delirium, capphologia, and tympanites.

When symptoms of putrid decomposition of the fluids appear you will think of *Muriatic acid*. It is the best remedy for the putrid sore throat which sometimes occurs as a complication. And it may occasionally be of service in hemorrhages from intestinal ulceration when Nitric acid fails. A sliding down in bed is a marked characteristic. The *Mercuric cyanide* may prove an efficient remedy when ulcerative changes, attended with great prostration, take place in the pharynx and larynx. *Nitric acid* will do good service when the evacuations consist of greenish mucus, and the tongue is thickly coated white. It is our main remedy in intestinal ulceration with hemorrhage, when the blood is fresh and of a bright red color. Profuse passive hemorrhages call for *Kreosote* or *Hamamelis* ^o. *Terebinthina* should be substituted when with the hemorrhage from the bowels there is *extreme tympanites*, and retention of urine. Urinary retention is best relieved by the catheter, which should be used when necessary twice a day. Our best remedy to prevent a recurrence of the retention is unquestionably *Opium*.

Phosphorus supplements Phosphoric acid, and is indicated when the disease assumes an adynamic type. Its stools are painless, profuse, and either resemble flesh water or are black like coffee dregs. Frequently there is watery, bilious vomiting in the first and at the beginning of the second period. It frequently arrests the preliminary diarrhea of the first week, and is invaluable for colliquative diarrhea occurring as a sequel. Phosphorus is an efficient remedy when *Bryonia* fails to relieve the catarrhal and pulmonary difficulties, and when, towards the end of the second period, there is a tendency to hypostatic consolidation, or pneumonia. *Spongia* will occasionally be of service when laryngeal symptoms predominate. *Senega* follows *Tartar emet.* in the treatment of the bronchitis, and is adapted to that passive form which is attended with copious secretion and a depressed state of system. *Tartar emet.* may prove useful when oedema of the lungs threatens, and there is great rattling of air

accumulated mucus in the chest. Should the mucus accumulation at any time threaten to cause paralysis of the lungs and asphyxia, *Moschus* will be your best remedy.

Mercurius dulcis may be useful during the second period, especially when there is danger of perforation from deep ulceration of the glands of Peyer. It may be given when the evacuations become more frequent at night, and are greenish or yellowish in color, provided the tongue, which is usually thickly coated, remains moist, and there is no delirium. When peritonitis occurs without perforation, you will think of *Mercurius cor.* In extreme cases, as your dernier resort, I may mention *Carbo veg.*, —a remedy which will frequently render you excellent service, in overcoming that complete torpor of vital functions, which neither phosphorus, muriatic acid, rhus tox., nor arsenicum have the power to remove. Along with well-timed alcoholic stimulation, it may prove useful, if at any time the functional powers of the heart speedily fail.

Belladonna may prove efficacious as an intercurrent remedy, when early in the disease the patient becomes delirious, sees all sorts of frightful phantasms, and no longer recognizes his friends and relatives. It is the remedy for the early bronchial complications in children, and also for the pharyngeal spasms which occasionally occur later on in the disease. *Hyoscyamus* may be needed when the delirium is continuous and does not yield to *Belladonna*. At any stage the occurrence of *lascivious mania*, on the one hand, or the sinking of the patient into a state of apathetic stupefaction, on the other, is a strong indication for this remedy. In the higher degrees of delirium, *Stramonium* is frequently the appropriate remedy, especially when there is great loquacity, and a mania for light and company. *Valerian* sometimes comes to the rescue, when bell., hyosc., and stram., all fail.

Opium will be of service when there is considerable stupor and but little fever, or when mild delirium alternates with stupor or stertorous breathing. It is the first remedy you will think of when sopor threatens to terminate in paralysis of the brain, and if it fails, *Lachesis* may cause the desired reaction, especially if with the soporous condition there is dropping of the lower jaw. When the stupefaction is attended with involuntary discharges of stool and urine *Arnica* may be compared.

Occasional intercurrent remedies are: *Merc. sol* or *Ledum* for the epistaxis in the first period. *Phosphorus* for epistaxis in the later periods. *Bell.* or *Merc. viv.* for the parotitis. *Laurocerasus* for the clonic convulsions of the limbs. *Veratrum alb.*, if weakness remains after the critical periods have passed. *Carbo veg.*, *Fluoric acid.*, or *Secale* for the bed sores. *Cocculus* for loss of appetite, *Cinchona* for excessive hunger, and *Nux vom.* for indigestion, during convalescence. And *Psorinum*, *Alstonia* or *Sulphur* for protracted convalescence.

Leading Indications.—The guiding symptoms for these our main remedies in typhoid fever, as well as for others occasionally of service, may be compiled as follows:

Agaricus musc.—Disinclined to answer questions (*phos. acid*). Desire for alcoholic drinks. Sensitive smell (*colch.*). Dry tongue with dryness and constriction in the fauces. Rumbling in the bowels with the passage of much inodorous flatus. Tremor of the hands. Aching along the spine and limbs. Pains in the legs especially in the hip joints. Twitchings of the gluteal muscles. Cramps of the hands and feet.

Apis. mel.—Muttering delirium. Sopor interrupted by piercing shrieks. Tongue swollen, dry, cracked, ulcerated, and protruded with difficulty (*ars.*, *rhus*). Great soreness in the pit of the stomach when touched (*bry.*). Swollen abdomen, sore to the touch (*lach.*). Stools occur with every motion of the body (*phos.*). Suppression of urine (*hyos.*). White miliary eruption on the abdomen. Tired, feeling as if bruised in back and limbs (*rhus.*). Carbuncles with burning, stinging pains (*ars.*). Great weakness, and sliding down in bed, (*mur. acid.*).

Arnica.—Patient sits in a semi-stupid state. Appears to be absorbed in deep thought yet thinks of nothing. Forgets the word while speaking (*baryta*, *rhus*). Declines to answer questions (*phos. acid*). Thinks he is well (*ars.*). Confused feeling in the head with pressure over the right brow. Unrefreshing sleep with anxious dreams. Muttering, and loud blowing during expiration. Delirium. Stupor. Great weariness, and prostration. A bruised, sore feeling, the bed feels too hard (*bapt.*). Epistaxis. Trembling of the lower lip. Tongue coated white, or dry with a brown streak in the middle (*bapt.*). Taste, breath and perspiration offensive. Abdomen distended.

Involuntary discharges of urine and fæces (*ars.*, *hyos.*). Violent stitches in the middle of the left chest (*bry.*). Lassitude and sluggishness of the whole body. Great sinking of strength, Petechiæ. Ecchymoses.

Arsenicum alb.—Great restlessness and anxiety. Constant motion of the head and limbs. Drawing pressive pain in the right side of the forehead. Deathly color of the face (*carbo veg.*). Cachectic look, sunken hippocratic countenance (*ver. alb.*). Grinding of the teeth (*hell.*, *hyos.*). Dropping of the lower jaw (*lach.*). Circumscribed redness of the cheeks. Hardness of hearing. Lips dry and cracked and covered with sordes. Tongue red, dry and cracked (*bry.*, *rhus*). Black leather-like tongue. Dryness of the mouth with violent thirst. Drinks often, but little at a time (*bell.*, opp. *bry.*). Unintelligible articulation as if the tongue was too heavy (*carbo veg.*). Intense burning pains in the stomach and pit of the stomach (*phos.*, *verat. alb.*). Violent and incessant vomiting. Meteoristic distension of the abdomen with gurgling (*lycop.*, *hyos.*, *terebinth.*). Ileo-cæcal region sensitive to the touch (*merc.*, *phos. acid.*). Brownish or watery, fetid, involuntary stools. Involuntary micturition (*hyos.*). Retention of urine. Voice weak, trembling, hoarse. Difficult breathing with great anguish. Very tenacious mucus in the chest (*tart. emet.*, *kali bich.*). Extensive pulmonary hypostasis. Pulse frequent, hard and tense, or small, trembling and intermittent. Irregular action of the heart, absence of the second sound. White miliary eruption (*lach.*, *mur. acid.*). Petechiæ (*rhus*, *secale*, *arn.*). Boils (*merc.*, *sil.*, *sul.*). Bed-sores (*carbo. veg.*, *fluoric acid*). Great weakness and prostration. Rapid emaciation (*secale*). Œdematous swelling of the feet. Cold clammy sweat. Cadaverous odor. Rose-colored spots on the chest and abdomen. Symptoms worse from 1 to 3 A. M.

Arum triph.—Lips and corners of the mouth sore, cracked and bleeding. Swelling of the submaxillary glands and neck. Tongue sore, red, with elevated papillæ. Fetid breath. Excessive salivation. Boring of the nose. Great restlessness, desires to escape, although perfectly conscious of what he is doing, and of what is said to him.

Baptisia.—Confusion of ideas (*gels.*). Great nervous rest-

lessless. Cannot sleep because the head feels scattered about and she cannot get the pieces together. Stupor. Heavy sleep, the patient can scarcely be aroused long enough to answer a question. Falls asleep in the midst of attempted answers (*arnica*, *hyos.*). Face dark red with a besotted expression. Head and face feel numb. Sordes on the teeth and lips. Mouth and tongue very dry. Fetid breath. Tongue swollen and thick. White furred tongue with red edges. Yellow or yellowish-brown coating along the center of the tongue. Bitter, flat or putrid taste in the mouth. Fetid, exhausting stools (*ars.*). Fetid, dark red urine. Tired, bruised, sick feeling in all parts of the body. Feeling as if the lower limbs were severed from the body (*opium*). Sensation as of a second self alongside in bed. Patient changes position frequently because the bed becomes too hard (*arnica*).

Belladonna.—Starting, jumping during sleep. Sleepiness but cannot sleep (*lach.*, *opium*). Violent delirium. Constant desire to spring out of bed (*hyos.*). Attempts to bite, strike and spit at the attendants (*hyos.*, *opium*). Violent throbbings in the brain. Throbbing of the carotids (*glon.*). Pressive pain in the forehead, obliging him to close the eyes. Sparkling, staring eyes (*hyos.*, *stram.*). Intolerance of light and noise. Face red, swollen and hot. Dryness of the mouth, tongue and throat. Tongue red at the edges and white in the center (*gels.*). Trembling and heaviness of the tongue with thick speech (*lach.*). Fluids escape through the nose (*kali bich.*, *lach.*). Sore throat, or a feeling as of a lump in the throat which induces hawking. Tenderness of the abdomen aggravated by the least jar. Retention of urine. Involuntary urination. Dry spasmodic cough, worse at night (*dros.*, *hyos.*). Pains come and go suddenly. Starts as if in affright on awaking or during sleep.

Bryonia.—Exceedingly irritable and inclined to be angry (*cham.*). Easily offended. Wants to go home. Hasty speech (*hepar sul.*). Violent, oppressive, stupefying headache. Vertigo with sensation as of the head turning in a circle (*bell.*). Visions when closing the eyes. Nightly delirium, especially about the affairs of the previous day or business matters. Buzzing in the ears with hardness of hearing. Nose-bleed, especially in the morning on rising. Face red, hot and puffy. Lips dry, brown

and cracked. Tongue thickly coated white (*merc.*) or yellowish. Dry feeling in the mouth. Intensely bitter taste (*nux*). Excessive thirst; drinks large quantities at a time. Nausea, or even vomiting, after every meal. Cannot sit up from nausea and faintness. Vomiting first of bile, then of fluids (*opp.*, *nat. mur.*). Epigastric region painful to touch and pressure (*ars.*, *nux*). Acute pains in the ileo-cæcal and splenic regions. Offensive stools. Dark, almost brown urine. Dry hacking cough, with stitches in the chest and region of the liver (*bell.*, *merc.*). Full, hard and rapid pulse. Pain in the back and limbs when moving. Restless sleep, with moaning, and with chewing motions. Great weakness and exhaustion.

Calcareæ carb.—Great anxiety with palpitation of the heart (*cact.*, *spig.*). Vertigo. Heaviness in the forehead. Hardness of hearing. Epistaxis, especially in the morning (*bry.*). White coating on the tongue (*merc.*). Sleeplessness from same idea arousing him from slumber. Abdomen hard and distended. Soreness in chest on inspiration. Short hacking cough. Excessive diarrhea. Ravenous hunger, or else loss of appetite. Profuse sweat every morning, and from the slightest exertion. Great weariness of the limbs as after a long walk. Tendency to obesity.

Camphor.—Sudden and great sinking of strength (*ars.*). Extreme restlessness and anxiety (*ars.*). Cold sweat all over (*verat. alb.*). Cold, pointed nose. Face pale and anxious. Coldness of the limbs (*ars.*, *verat.*). Cramps of the calves (*sulph.*). Small, weak, scarcely perceptible pulse (*carbo veg.*). Violent delirium. Dullness and heat of the head with cold, clammy skin. Tongue cold (*carbo veg.*, *verat. alb.*). Great thirst. Rolling and rumbling in the bowels with involuntary evacuations.

Carbo veg.—Restlessness and anxiety. Greenish color, or great paleness of the face (*ars.*). Hippocratic countenance (*verat. alb.*). Severe nose-bleed several times daily. Dullness of the eyes, pupils insensible to light. Loss of hearing. The gums are painfully sensitive while chewing. Cold breath and tongue. At times the tongue is moist and sticky. At others it is dry and cracked. Hawking of mucus in the throat. The epigastric region is distended. Frequent and violent eructations (*puls.*). Flatulent distention of the abdomen. Emission of

large quantities of offensive flatus. Colliquative diarrhea, putrid and involuntary (*ars.*). Diarrhea during convalescence. Bronchial catarrh with difficult expectoration of tenacious mucus. Loud rattling in the chest. The pulse is thread-like and scarcely perceptible. Coldness of the surface. Cold sweat on the limbs. Cold breath. Threatened paralysis of the lungs and heart. Bed sores (*ars.*, *fluoric acid*, *secale*).

Cinchona.—Sense of internal illness as of impending disease. Frequent nose-bleed, especially in the morning (*bry.*). Pale, earthy, grayish-yellow complexion (*ars.*). Constant inclination to stretch the limbs or change position. Enlargement of the liver and spleen. Bitter or sour taste. Empty eructations. Milk deranges the stomach (*sulph.*). Tympanites. Painless, indigested stools (*podo.*). Profuse sweat during sleep, especially on the side on which the patient lies. Great weakness. Protracted convalescence.

Cocculus.—Slowness of comprehension. Very sensitive mood. Vertigo with nausea when rising up in bed (*bry.*) must lie down. Stupor. Coma vigil. Heaviness of the lids. Noise in the ears like the rushing of waters. Metallic, coppery taste with loss of appetite (*ars.*, *rhus*). Nausea with tendency to faint. Drink rolls audibly down the throat (*hydr. acid*). Great distention and rumbling in the abdomen. Weakness of the cervical muscles. Feet and hands fall asleep alternately. Great general weakness and weariness after over-exertion.

Colechicum.—External impressions, especially strong odors, disturb the patient. Dullness of perception. Delirium with headache (*bell.*). Suddensinking of the vital forces. Cadaverous appearance. Hollow staring eyes. Lips, teeth and tongue covered with sordes. Skin dry. Nose-blee 1 evenings. Body hot. Hands and feet cold. Cold sweat on forehead. Tongue, heavy, stiff and insensible (*con.*). Tongue protruded with difficulty. Grinding of the teeth (*hell.*, *hyos.*). Epigastrium extremely sensitive to pressure (*bell.*). Violent burning or icy coldness in the stomach (*ars.*). Great thirst. Distention of the abdomen. Watery diarrhea. Involuntary stools. Dark, liquid, offensive, painful stools. Suppression of urine. Involuntary micturition. Irregular intermittent respirations. Small, quick, scarcely perceptible pulse. Edematous swelling of the legs and feet (*ars.*).

Great exhaustion and weakness as after exertion, in the autumn.

Gelsemium.—In the prodromic period. Dullness of the mental faculties (*bapt.*). Trembling from weakness. Vertigo and blurred vision (*iris vers.*). Drowsiness, vertigo, and great muscular prostration. Heaviness of the head, relieved after profuse emission of watery urine (*phos. acid.*). Severe pains in the head, back and extremities. The brain feels as if bruised (*bell.*). Head feels as “big as a bushel.” Cephalalgia with aching lancinating pains extending from the left occipital region through the head to the forehead and eyeballs. Drooping of the eyelids (*caust.*). Heavy, besotted expression (*bapt.*). Crimson flush of the face. Tongue coated yellowish-white. Can hardly protrude it, it trembles so (*bell., lach., secale*). Numbness of tongue, feels so thick, can hardly speak (*caust.*). Iliac tenderness. Chilliness. Coldness of the hands and feet. Complete prostration of the entire muscular system.

Hamamelis.—Great lassitude and weariness of the limbs. Extreme soreness of the abdomen. Bloody alvine dejections of tar-like consistency (*alumen*, black). Profuse nose-bleed with feeling of tightness of the bridge of the nose (*dulc.*).

Helleborus nig.—Sensation of soreness of the back part of the head with stupefaction. Eyes vacant, pupils dilated (*bell., hyos.*). Insensibility. Slow of comprehension. Lies in a state of constant slumber. Utters no complaint. Chewing motions of the jaws (*bry.*). Convulsive twitching of the muscles (*cupr.*). Sliding down in bed (*mur. acid.*). Small, slow, tremulous pulse. Trifling loss of flesh.

Hyoscyamus.—Complete loss of consciousness (*bell., opium*). Coma vigil. Muttering with picking at the bed-clothes (*opium*). Muttering loquacity (*apis*). Answers questions correctly, when asked, but lapses again into delirium (*arnica, bell.*). Whines and don't know why. Inability to direct the thought. Sleeplessness or constant muttering sleep. Constant delirium with great restlessness. Jumping out of bed. Thinks he is in the wrong place. Attempts to run away (*bell., bry.*). Desires to uncover and remain naked. Flushed face, stupid expression (*bapt.*). Red, staring, sparkling eyes (*bell.*). Pupils dilated (*bell.*) and insensible (*opium*). Objects appear red as fire, or

too large (*opp. plat.*). Deafness. Constrictive sensations in the throat with inability to swallow (*bell., stram.*). Clean, parched, dry tongue. Much thirst. Hiccough. Putrid breath. Involuntary stools at night (*ars., rhus*). Retention of urine. Involuntary urination. The urine leaves reddish streaks on the sheet (*lycop.*). Grating of the teeth (*apis, hell.*). Trembling of the limbs. Subsultus tendinum (*phos. acid*). Rose spots on the chest and abdomen.

Ignatia.—Great impatience. Changeable disposition. Sensation as if swinging to and fro in a swing. Broods over imaginary troubles. Flickering zigzags before the eyes. Frequent sighing. Over-sensitive to pain (*coffea*). Sour taste in the mouth. Convulsive motions of the face and extremities (*stram.*). Single jerks of the limbs on falling asleep. Troublesome dreams of one and the same thing, all night. Palpitation of the heart.

Lachesis.—Great mental and physical exhaustion. Sleepiness, but unable to sleep. Sleep, followed by aggravation of all the symptoms. Stupor and muttering (*apis*). Loquacious, constantly changing from one subject to another. Thinks she is dead. Sunken countenance. Dropping of the lower jaw (*lycop., opium*). Tongue dry, red or black, cracked and bleeding (*ars.*). It trembles when protruding it (*gels., bell.*). In putting out the tongue it catches on the teeth or under lip. Lips dry, cracked and bleeding. Appetite variable. Desire for oysters (*lyc.*). Hyperæsthesia of the abdomen. Offensive stools. Intestinal hemorrhage containing flakes and granules of decomposed blood. Dyspnoea. Hawking of mucus with rawness in the throat. Superficial ulcers (*merc., nit. acid*) of a blackish-blue appearance. Falling off of the hair (*merc., nit. acid., phos.*). In the spring.

Laurocerasus.—Irregular beating of the heart with slow pulse (*digit.*). Clonic spasms of the extremities (*canth.*). Want of energy of the vital powers, and want of reaction.

Lycopodium.—Depression of spirits (*nat. puls.*). Great fear of being left alone. Uses wrong words to express an idea (*arnica, anacardium, graph.*). Restless sleep. Subsultus tendinum. Earthy color of the face. Circumscribed redness of the cheeks. Face suddenly yellow or pale after the first week (generally fatal). Putrid smell from the mouth. Tongue coated

white, or else red and dry. Vesicles on the tongue. When the tongue is spasmodically thrust to and fro between the teeth. The lower jaw drops (*opium, mur. acid., lach.*). Fan-like motion of the *alæ nasi*. Desire for sweet things. A little food seems to fill the stomach full, and causes fullness and distention of the abdomen. Bowels much distended with rumbling in the left hypochondrium. Chilliness in the rectum before stool. Urine leaves a red, sandy stain on the sheet (*cinch., phos.*). Shortness of breath. Cough with scanty, gray, salty expectoration. Coldness of the hands and feet. One foot hot and the other cold. Falling out of the hair (*graph., merc., phos.*). The hair becomes gray early. Nervous debility. Emaciation.

Mercurius.—Heaviness of the head with great inclination to sleep. Answers questions slowly. Great weariness and prostration. Trembling. Pale, earthy-colored, puffy face (*ars., puls.*). Eyes dull. Tongue swollen, soft and flabby, taking impressions of the teeth on its edges. Putrid odor from the mouth. Region of the liver painful and sensitive to contact (*bell., bry.*). Yellow-green stools. Bilious, slimy or watery diarrhea. Abdomen hard, distended and painful. Inguinal glands swollen or suppurating (*nit. acid.*). Frequent urination. Urine leaves a whitish sediment. Clammy perspiration at night. Icteroid hue of the skin. Nose-bleed during sleep. Sudamina.

Muriatic acid.—When decomposition of the fluids is slow and extensive. Continuous delirium. Vivid hallucinations. The patient is busied with past and present events. Forgetful of time and place. Irritable. Sleepiness in the daytime, sleeplessness at night with muttering delirium. Constant inclination to slide down in bed. Photophobia. Glistening eyes, contracted pupils. Over-sensitive to sounds. Acuteness of taste and smell. Excessive dryness of the lips, mouth and tongue. Tongue heavy, like lead, preventing talking. The lower jaw hangs down. Great thirst. Watery diarrhea mixed with lumps of whitish mucus. Involuntary stools while urinating. Profuse discharge of clear acid urine. Pulse rapid and very feeble, intermits every third beat (fourth beat, *nit. acid.*). Respirations accelerated. Excessive prostration. Painless, rapidly spreading, indolent bed-sores. In low fevers.

Nitric acid.—Irritable and excitable. Anxiety with fear of

death (*ars.*). Frequent pains in all parts of the body, suddenly appearing and disappearing. Pale, yellowish complexion. Putrid smell from the mouth (*merc.*). Appetite for chalk, lime and earth (*alumina*). White coating on the tongue. Ulcers in the mouth and fauces. Accumulation of mucus in the throat. Great sensitiveness and distention of the abdomen. Intestinal hemorrhage. Green, slimy, acrid, fetid evacuations. Rattling cough with purulent expectoration. Brownish, bloody sputa. Pulse irregular, intermits every fourth beat (third beat, *mur. acid*). Ulcers with stinging, pricking pains as from splinters. Emaciation, especially of the arms and thighs. Profuse falling off of the hair (*graph.*, *nat. mur.*, *phos.*). After the abuse of mercury.

Nux moschata.—Fitful mood. Loss of memory (*anac.*, *phos. acid*). Difficult comprehension (*am. carb.*). Great drowsiness. Dryness of the mouth, tongue, and lips, with taste as after eating strongly salted food. Little or no thirst. Rolling, rumbling or gurgling in the abdomen (*aloes*). Colic, relieved by hot wet cloths. Thin, yellow diarrhea like stirred eggs. Offensive colliquative diarrhea. Small, slow pulse. Great languor and excessive muscular restlessness.

Nux vomica.—Over-sensitiveness to external impressions (*cinch.*). Delirious phantasies on lying down. Chilliness on slight movement. Dryness of the mouth and tip of the tongue. Flatulent distention of the abdomen after eating (*cinch.*, *lycop.*). Desire for fat food. Hunger with aversion to food (*opium*). Alternate constipation and diarrhea. Intestinal cramps. Great desire to sit or lie down. Emaciation. Chlorosis.

Opium.—Drowsiness or sopor. Complete loss of consciousness (*hyos.*) with slow stertorous breathing. Stupid sleeplessness with frightful visions. Suffocating nightmare. Muttering delirium. Attempts to escape (*bell.*, *hyos.*). Contracted pupils (*hyos.*). Glassy, half-closed eyes. Face, dark red, bloated, hot (*bell.*), flushed (*hyos.*), or pale and sunken. Bed feels hot, can hardly lie on it. Violent thirst. Irregular respirations. Deep snoring, slow, breathing with mouth wide open. Convulsive movements and numbness of the limbs. Involuntary, offensive stools (*ars.*). Dark, fluid, frothy evacuations. Violent gripping, cutting pain in the abdomen. Retention of urine. Dropping

of the lower lip and jaw (*lach.*, *mur. acid*). Profuse sweat. Coldness of the extremities.

Phosphorus.—Constant sleepiness. Low, muttering delirium (*arn.*, *bapt.*, *rhus*). Coma vigil. Inability to concentrate thought (*arn.*, *rhus*). Carphologia (*arn.*, *hyos.*). Contracted pupils (*opium*, *physostigma*). Pale, sallow or changeable color of the face. Dry, immovable tongue, cracked and covered with sordes (*ars.*, *verat. alb.*). Thirst, with desire for very cold drinks. Burning in the stomach (*ars.*). Regurgitation of food in mouthfuls. Drinking causes rolling and rumbling in the abdomen. Sensation of weakness and emptiness in the abdomen (*sepiæ*). Vomiting of watery, bilious and slimy masses with great pain in the first and at the beginning of the second week, relieved for a time by ice, or very cold food or drink. Painless diarrhea, with abdominal distention and loud rumbling (*cinch.*). Watery, greenish, sago-like, or bloody evacuations, worse after eating. Typhoid pneumonia. Hard, dry cough with violent oppression of the chest, and difficult respiration. Difficult expectoration of tenacious mucus, or of mucus streaked with blood. Cough worse from evening to midnight (*carbo veg.*, *puls.*), and when talking (*dros.*). Loud mucous rales in the lower lobes (*ipecac.*, *tart. emet.*). Hepatization of the lungs. Small, quick, easily compressed pulse. Dullness of hearing, especially of the human voice. Profuse epistaxis. Rose spots and ecchymoses. Great emaciation. Weakness in the extremities, as if paralyzed.

Phosphoric acid.—Indifferent. Disinclination to talk (*phos. opp. stram.*). Incapacity for thought (*gels.*). Answers questions slowly and reluctantly, or short and incorrectly (*phos.*) Somnolency with muttering delirium. Pale, sickly complexion. The eyes are either dim or glossy. Hemorrhage from the nose of dark blood (*ham.*). Intolerance of musical sounds (*caust.*) Deafness with roaring in the ears. Dryness of the mouth and throat without thirst (*nux*). Grayish coating on the tongue. Desire for juicy things (*puls.*). Pressure in the stomach after eating. Meteoristic distention of the abdomen with rumbling and gurgling. Involuntary stools. Thin, whitish-gray evacuations. Dry, tickling cough. Frequent emission of pale, watery urine, forming a milky-white cloud, especially at night. Frequent, small, feeble pulse. Dry, clammy skin. Bluish-red spots

on the parts upon which the patient lies. Profuse night and morning sweat. In young persons who have grown very rapidly.

Psorinum.—Loss of memory during convalescence. Despairing, melancholic mood (*nux*). Deep-seated, heavy pain in the region of the liver. Dark, brown, *fetid* stools. Cough with difficult green mucous expectoration. Great debility (*sulph.*). Profuse perspiration from the least exertion, and at night (*cinch., phos.*).

Pulsatilla.—Peevishness, or inclination to weep. Dullness with pressive pain in the forehead. Restless sleep with sensations of heat. Chilliness. Vivid, frightful, anxious dreams. Offensive odor from the mouth. Dryness of the tongue, as if burnt, without thirst (*mag. mur.*). Tenacious mucus in the mouth. Constant spitting. Bitter taste (*bry.*). Distress in the stomach an hour after eating (*nux*). Pulsation in the epigastrium. Gnawing in the stomach as from hunger. Loud and painful rumbling and gurgling, especially at night. Emission of fetid flatus. Watery diarrhœa, preceded by rumbling, worse at night. Great weariness and prostration. Wandering pains (*kali bich.*).

Rhus tox.—Great restlessness and uneasiness (*ars.*). Confusion and dullness, with vertigo. Incoherent muttering. Answers questions correctly, but slowly (*bry., hep.*). Active delirium and great prostration. Vivid, troublesome dreams of excessive bodily exertion. Headache, worse from opening and moving the eyes (*puls.*). Pale, sunken face with blue rings around the eyes. Dark, livid redness of the cheeks. Epistaxis, morning or night. Dry, red, cracked tongue (*bapt., bell.*). Redness of the tip of the tongue in the shape of a triangle. Putrid taste and breath. Induration of the parotid and sub-maxillary glands. Sordes. Great thirst for cold drinks, especially cold milk. Nausea. Copious, thin, yellow evacuations, worse at night. Involuntary, fetid stools, during sleep. Dry, tickling cough, worse in the evening and before midnight. Infiltration of the lower lobes of the lungs. Severe cough with tough, bloody expectoration. Soreness as if beaten in the hypochondria. Aching pains in all the limbs; must constantly change position.

Secale corn.—Constant sighing. Hiccough (*ars., nux mos.*).

Great prostration and extreme restlessness. Aversion to being covered. Anxiety and burning at the pit of the stomach (*ars.*). Fear of death. Cold perspiration on the face and forehead. Sweat from the head to the epigastrium. Face, pale and sunken. Unquenchable thirst. Desire for sour drinks, especially lemonade. Painless, muco-bilious vomiting, with great prostration. Ravenous hunger. Thin, olive-green stools. Involuntary evacuations. Suppression of urine. Great trembling when attempting to move. Fuzzy feeling in the extremities. Cold, blue, shrivelled skin. Extensive ecchymoses. Bed-sores.

Silicea.—Disposition to boils. Periostitis of the sacrum. Ulcers with stinging, sticking, burning pains (*ars.*, *lach.*). Weakness and sense of great debility. Perspiration on the slightest exertion (*sepiä*). Sensitive to cold air, takes cold easily. Emaciation.

Stramonium.—Stupid indifference (*phos. acid*). Loquacious delirium (*lach.*, *lachnanthes*). Furious delirium, worse from looking at shining objects. Tries to escape, struggles to get out of bed (*bell.*, *rhüs*). Wide open, staring eyes (*bell.*, *hyos.*). Transient loss of sight, hearing and speech. Oblique vision. Dryness of the throat. Violent thirst, especially for sour drinks (*bry.*, *secale*). Yellowish-brown coating on the tongue which is dry in the center (*bapt.*). All food tastes like straw (*sulph.*). Black stools which smell like carrion (*ars.*, *carbo veg.*). Hard, tympanitic abdomen. Suppression of urine. Involuntary urination. Constant restlessness, with jerking motions of the limbs and of the whole body. Carphologia. Subsultus tendinum.

Sulphur.—Anxiety in the evening, with inability to sleep at night. Weakness of memory, particularly for names. Heat, fullness and pressure in the forehead. Hardness of hearing (*caust.*). Weakness of the chest when talking (*phos.*, *stan.*). Dyspnoea. Short, dry, nocturnal cough. Anorexia or else ravenous hunger, particularly about 10 or 11 A. M. Stomach feels distended after eating only a little (*lyc*). The abdomen is painfully sensitive to the touch (*bell.*). Morning diarrhea with great prostration. Offensive, turbid urine (*lach.*).

Sulphuric acid.—Irascibility. Hardness of hearing (*calc.*, *carb.*, *sulph.*). Deathly paleness of the face. Dry, red or brown tongue. Aphthæ. Swelling and inflammation of the sub-max-

illary glands. Violent hiccough. Dark, persistent hemorrhages. Blue, ecchymotic spots (*carbo veg.*, *nux mos.*, *phos. acid.*). Shortness of breath. Great weakness and prostration.

Tartar emet.—Irresistible inclination to sleep. Trembling of the whole body. Pale, sunken face. White pasty coating on the tongue. Tongue red in streaks and dry in the middle (*rhus*). Continuous anxious nausea. Violent and painful urging to urinate with scanty or bloody discharge (*can. sat.*). Great rattling of mucus in the chest (*ipecac*). Threatened cedema of the lungs (*moschus*).

Terebinthina.—Stupefaction. Coma (*opium*). Excessive prostration. Dry, smooth, glossy tongue. Tympanites. Fetid stools. Intestinal hemorrhage. Quick, small, thready, almost imperceptible pulse. Occasional subsultus tendinum. The urine is scanty and has the odor of violets.

Veratrum alb.—Sudden sinking of strength. Hippocratic countenance. Cold perspiration, especially on the forehead. Sunken eyes. Pointed nose. Tongue cold (*carbo veg.*), or coated white with red tip and edges. Violent thirst for cold water (*ars.*, *phos.*). Excessive hunger for fruits, acids or salt things. Violent vomiting and watery diarrhea. Oppressive and spasmodic contractions of the chest. Cold breath. Suppression of urine. Icy coldness of the hands and feet. Continued profound sleep. The patient remembers events only as dreams.

Veratrum vir.—Muttering delirium. Restless sleep, with dreams of being drowned. The eyes remain open and the pupils are dilated. The face is flushed or else pale and covered with cold perspiration. The tongue is coated white or yellow, with a red streak down the center. The pulse is irregular, hard and frequent, and the heart beats rapidly when turning over in bed (*bell.*). Oppression of the chest, with slow, labored breathing. Dark, turbid, fetid urine. Involuntary micturition. Hiccough. Subsultus tendinum. Carphologia.

Zincum.—Weakness of memory (*anac.*). Unconsciousness. Brain exhaustion. Delirium with attempts to get out of bed (*hyos.*). Constant jerking of the whole body during sleep. Carphologia. Subsultus tendinum. Sliding down in bed (*mur. acid.*). Involuntary evacuations. Bed-sores.

HYGIENIC AND DIETETIC TREATMENT.

In the treatment of typhoid fever it is highly important that the patient be properly hygiened and fed.

As soon as the disease is suspected the patient should be ordered to bed, and not permitted to leave it until some days after complete convalescence. Absolute mental and bodily rest is a primary necessity. And in every case the use of the urinal and bed-pan to receive the evacuations from the bladder and bowels should be rigidly insisted upon. The sick-room should be large and well ventilated, and situated as remote as possible from the original source of infection. The temperature of the room must be kept below 60° Fahr. All superfluous articles of furniture should be removed from the apartment. The patient should lie on a mattress—never on a feather bed—with a linen sheet and a woolen blanket as a covering. The bed and body linen should be changed daily, and immediately thrown into a vessel containing a solution of carbolic acid, before being removed from the room. The bed and room should be sprinkled with Platt's chlorides, and the water-closet must be frequently disinfected. The room should be kept perfectly quiet. Visitations must not on any account be indulged in during the course of the fever, and to but a limited extent during the early days of convalescence. The position of the body should be frequently changed, and when sordes collect upon the teeth they may be removed by the use of a soft wet towel. Pieces of ice allowed to dissolve in the mouth will to some extent limit the formation of sordes.

Tympanites is constantly present in typhoid fever, but if at any time it becomes great, and the accumulation of flatus in the colon is excessive, it may be necessary to carefully introduce into the bowel an intestinal tube to remove part of the accumulated gas. When intestinal hemorrhage occurs an ice bag filled with broken ice may be applied to the abdomen. The food at such times should be limited to meat essence, wine-whey or koumyss, and must be taken ice cold. Meat essence is prepared by cutting a pound of fresh lean beef into small pieces, and putting it into a pint bottle without water. It is then corked loosely, and the bottle immersed to its neck in cold water in a stewpan. Bring the water to a boil, and let it boil for two hours. Then pour off the essence without filtering. When there is great abdom-

inal tenderness, thinly spread mush or flax-seed poultices, well smeared with lard, are exceedingly grateful. When intestinal perforation occurs, opium should be administered in addition to the indicated remedy, and in doses sufficient to secure absence of intestinal motion for several days. The hypogastrium must be examined by palpation and percussion twice daily, and the catheter used when necessary. In long protracted cases, bed-sores are to be prevented by frequent changes of position, by the removal of pressure by means of cold water bags or air cushions, and by bathing the parts with whisky and arnica. Points of pressure may also be protected by a piece of kid spread smoothly with soap plaster. When erosions appear, the parts should be washed with a weak solution of carbolic acid, and afterwards dressed with lint covered with the glycerole of calendula, or with equal parts of copaiba and castor oil.

The *cold bath*, first recommended by James Currie, of Liverpool, England, in 1797, but which had fallen into disuse, was revived by Brand in 1868, and is now quite extensively used in Europe. It has not, however, been very generally practiced in this country, and it is not probable that it will be accepted in the immediate future as a general method of treatment of typhoid fever. Mild cases do not require it, and in advanced cases it is not safe. It should never be used after the second week of the fever. And as a general rule, if after using from four to eight baths in the course of twenty-four hours, the fever rises to the same or a higher degree than before using the bath, little or no benefit will accrue from a continuance.

Loomis gives the following general rules for using Ziemssen's gradual method of bathing: As soon as the axillary temperature in the evening rises above 103° Fahr., place the patient in a water-bath having a temperature of 70° Fahr. or 80° Fahr., and gradually lower that temperature by the addition of cold water or ice, until the temperature of the patient begins to fall. It may be necessary to lower the temperature of the bath to 60° Fahr. before the temperature of the patient is affected; but the lowering of the body temperature must be accomplished by the lowering of the temperature of the bath, care being taken that the latter does not fall below 60° Fahr. When the temperature begins to fall, the thermometrical observations must be renewed every two or three minutes. While the baths are being used,

the temperature must be taken by placing the thermometer in the rectum. If it falls rapidly—that is, two or three degrees in five or six minutes—as soon as the fall has reached 103° Fahr., remove your patient from the bath; if it falls slowly, as soon as it reaches 101° Fahr., he should be removed and immediately placed in bed. Never keep the patient in the bath until the temperature shall have reached the normal standard; for this may cause him to pass from a condition of fever into a state of collapse, as the temperature continues to fall for some time after his removal from the bath. While in the bath, cold should be applied to the head by means of a sponge wet in cold water or by an ice bag.

The cold pack is much less effective than the bath, as four packs are only equivalent to one cold bath. Frequent *sponging* of the body with equal parts of aromatic vinegar and tepid water, or with tepid whisky and water, will allay dryness and heat of the skin, and if done in the evening will promote sleep.

The *diet* should be nutritious, *liquid*, and on account of the enfeeblement of the digestive and assimilative powers, easily digestible. It should be administered in small quantities and at short intervals. The best beverage is fresh water, which may be given often. Milk and water, koumyss or thin barley water are grateful drinks. Fruits should be prohibited; and solid food must not be given until the temperature has remained at the normal for at least three successive days. After the first week as much food should be given as can be properly digested, and when there is extreme prostration it should be administered every half hour or hour.

Milk, which has been aptly defined as fluid flesh, bone and nerve, leads the list of fever foods. It is the best diet during the stage of catarrhal inflammation. It does not, however, agree with all cases, and must not be used in unlimited quantities, as it sometimes lies in curds in the stomach and bowels. In order to make it more digestible it may be reduced by dilution with one-half or one-third of lime water. The addition of two or three grains of pepsin and pancreatin to each cupful of food proves a valuable aid to digestion. Usually patients will take from four to six quarts of milk and lime water per day. Meat broths made of beef, mutton, veal or chicken, and containing a little barley or well cooked rice, may be given. The addition of claret or port serves to make the broths more palatable. Gen--

erally it will be well to alternate milk with the broths, every two hours during the day, and every three hours during the night. Koumyss or fresh buttermilk often proves a very grateful change to patients who weary of milk, and may be given as a substitute where patients will not drink the latter.

Beef-tea, which is claimed by some practitioners to be the proper diet for typhoid patients, will never take the place of milk. To prepare it,* chop a pound of lean beef into very small pieces, pour over it about a pint of cold water, cover, and let it stand two hours by the side of the fire; then place it on the fire and allow it to boil for a half hour. Afterwards remove the scum, and skin off all the fat; salt to the taste; do not filter or strain it, simply pour it off. If rightly made it should have a rich brown appearance when stirred. As a rule more patients dislike than like it. The place of usefulness assigned to it is after the middle of the second week, and yet I am free to say that you will be often disappointed in its use. When administered indiscriminately it is supposed to have a tendency to keep up the temperature.

For general use you will find Leube's Beef Solution† the best animal diet preparation, as it is highly nutritious and is more easily digested than any other of the meat extracts. Whenever the stomach fails to retain food and rejects even Leube's solution, Valentine's Meat Juice may be administered hypodermatically in doses of from one to two fluid drachms. Meat-pancreas injections, so useful in gastric ulcer, and prepared by adding one and one-half ounces of finely chopped pancreas, and five ounces of finely scraped beef, to three ounces of lukewarm water, and stirring to the consistence of thick pulp, may if used with caution, per rectum, be of benefit in patients who are very low. In cases of extreme prostration the intravenous injection of milk—prepared by adding ten grains of carbonate of ammonia to six ounces of goat's milk—has been used with good effect.

Alcoholic stimulants are unnecessary and injurious up to the end of the second week, and many cases require no stimulation

* Johnston's Fluid Beef, or Scott and Bowne's Soluble Peptonized Granulated Beef, may be used.

† Prepared by Ph. Rudisch, of New York.

throughout the whole course of the attack. The indications which call for their administration are mainly such as are dependent upon the weakness of the heart's action, and consist of a feeble or imperceptible cardiac impulse, and a diminution or early subsidence of the first sound. Stimulation may be continued, when, under its use, the tongue becomes moist, the first sound grows more distinct, the pulse slower, and the sound clear; it should be abandoned, when, under its administration, the tongue becomes dry, the heart's action becomes more rapid, or the brain symptoms deepen. It is difficult to lay down rules as to the quantity of wine or other stimulants to be exhibited; every case has its own peculiarities. At first half a wine-glassful of wine-whey—prepared by adding half a pint of sherry to one pint of boiling milk, and straining after coagulation—may be given every three hours. Later, if the patient grows weaker, half an ounce of brandy or an ounce of wine may be given with the same or twice as much milk, every two to four hours, especially at night. Whenever the urine becomes albuminous, brandy and whisky must be used with the greatest caution. *Never despair as long as your patient can swallow.*

During convalescence, if stimulants are needed, sherry wine either alone or as wine-whey is the most eligible. In the first week of convalescence, the diet should be restricted to milk custards, and farinaceous foods and animal broths. Wine of pepsin taken after each meal materially aids digestion. After the end of a week, solid food may be gradually resumed. Milk punch and egg-nog are often of service. If diarrhea is present during convalescence it is safer to restrict the patient to milk and cream. All exercise other than simply walking around the room should be prohibited.

When convalescence is tardy the patient will be greatly benefited by change of air and scenery. A short residence at the seashore usually exerts a very salutary influence in promoting an early restoration to health. Aitkin utters a truism when he says no man can be considered fit for work for three, or four months after an attack of severe typhoid fever.

LECTURE XIII.

Yellow Fever.

We are to-day to study Yellow Fever—the second in the list of miasmatic-contagious fevers.

Definition.—It may be defined as a continued fever produced by the introduction into the human organism of a specific poison, and consisting of a single paroxysm of indefinite duration, but always tending to terminate in two or four days, or a multiple thereof. It is characterized by early epigastric tenderness, severe nausea, projectile vomiting; fiery eyes, violent supra-orbital headache; pains in the back and calves of the legs; a slow, uncertain, easily compressed pulse; a deep yellow or bronzed skin—after the third day; black vomit—one or two days previous to death; suppression of urine and albuminuria. It is a portable disease and has an average duration of six days. One attack affords almost certain immunity for a life-time. After death constant lesions of the liver, kidneys, blood, skin, and mucous membrane are found.

Synonyms.—It has been variously described as: *Febris flava*. *Febris typhus icterodes*. *Febris cum nigro vomito*. *Fievre jaune*; and *Typhus d’Amerique*.

History.—It is said to have made its first appearance either in the West Indies or in Mexico many years before the Spanish conquest. It prevailed in Central America in 1596, and among the Indians of New England as early as 1618. It visited New York for the first time in 1668, Charleston in 1682, Boston in 1691, Philadelphia in 1695, and the Gulf Coast in 1702. It made its first appearance in Europe, at Cadiz, Spain, in 1705. Pensacola received its first visitation in 1764, and New Orleans in 1796.

The epidemic of 1804, in Spain, was attended by the heaviest mortality on record. The worst epidemic in New Orleans was in 1853. Memphis was first visited in 1855, although the disease appeared at Ft. Pickering, now a suburb, in 1828. The second visitation was in 1867. A very destructive epidemic devastated the city in 1873, and in 1878 a little less than one-third of the total population died. In 1870 the disease was very destructive in Barcelona, Spain, and in 1871 at Buenos Ayres. In the great epidemic of 1878 the mortality record of New Orleans—which stands next to Memphis—is estimated at 4,600, and that of Vicksburg at 872. In this epidemic the disease extended as far north as St. Louis, Mo., Cairo, Ill., and Gallipolis, Ohio.

Geographical Limits.—Yellow fever is uncommon in elevated regions, and seldom occurs beyond 4,000 feet above the level of the sea. It rarely prevails beyond 45° north latitude and 23° south latitude. Epidemics have occurred as far north as Quebec, Canada; as far south as Montevideo, Uruguay; as far east as Madrid, Spain; and as far west as Mexico. The conspicuous zones for its ravages are: Barbadoes, West Indies, on the east; Tampico, Mexico, on the west; Rio de Janeiro, Brazil, on the south; and Charleston, U. S., on the north.

In Europe it has invaded Spain, Portugal, Italy, France and England. It has frequently prevailed along the western coast of Africa; recently in the province of Senegal. In South America it has prevailed in Venezuela, Colombia, Peru, Bolivia, Buenos Ayres, and Brazil. In North America, it has invaded Mexico, the West Indies, Canada, and all the States of the Union, except Wisconsin, Michigan, Iowa, Minnesota, Kansas, Nebraska, California, Colorado, Oregon, Nevada, and the Territories, omitting the Indian Territory. It often visits the tropical islands of the Atlantic, but has never made its appearance among the islands of the Pacific. It is unknown in Asia, Australia, the East Indies, and along the eastern shores of Africa; and has only been felt sporadically along the Pacific coast of the American continent.

Yellow fever has become naturalized in Brazil, the West Indies, Venezuela, New Granada, Mexico, and along the Gulf and south Atlantic coasts of this country as far as Charleston.

Etiology.—The nature and source of the yellow fever poison

are as yet enshrouded in uncertainty. We simply know that it originates outside of the organism, that it can be reproduced only when the atmosphere has become loaded with emanations from animal and vegetable decomposition, that it is portable, and that it can be conveyed from one locality to another by means of clothing, merchandise, and more particularly in the holds of vessels. It resembles the poison of typhoid fever in that it cannot be conveyed directly from the sick to the healthy, but must first be deposited in, or come in contact with, decomposing organic matters. Atmospheric air is the usual medium through which the infection is received into the human system.

As no satisfactory proof of the *de novo* origin of yellow fever can be found, many ingenious and at times absurd theories of causation have been promulgated by physicians. Dr. Stone holds to the wave or cycle theory, and believes that the epidemic influence is wafted through the atmosphere in waves or cycles, in gradual and regular approaches. Dr. Stille attributes its origin in this country to the Gulf Stream. Dr. Ford advocates the theory of fermentation. Dr. Labadie favors the explosive theory, believing that it is a peculiar subtle poison that explodes in the air, like an inflammable substance. But the majority of physicians hold with Dr. Davidson that it is due to a living organized microscopical entity, which, generated out of pre-existing germs under favorable circumstances, propagates itself indefinitely; and, as Sternberg suggests, that something given off from the body of the sick, after a time and with the concurrence of favorable conditions, becomes or produces the true poison of the disease.

The meteorological and local conditions which favor its evolution, and which seem to be necessary to the evolution of yellow fever epidemics are:

1. *A continued high temperature.*—Yellow fever never spreads where the thermometer stands less than 72° Fahr. The average temperature for twenty-four hours must be above 77° Fahr. Heat may be considered as the only essential in the causation of the disease.

2. *Excess of moisture.*—A certain amount of moisture either in the atmosphere or in the substance of the soil is generally necessary for the reproduction of the germ. Heavy rains followed by a very high temperature favor the rapid spread of yellow

fever. A sufficient amount of moisture is, in this country, always present in the atmosphere. In the Southern States, the clear days of the season of the disease are called "yellow fever weather."

3. *Organic matters in a state of decomposition*.—Decaying animal and vegetable matters are exceedingly favorable if not essential to the reproduction of the germ. Bilge-water in the holds of ships may be the medium of transportation of the morbid agent from port to port, while accumulated filth, especially city garbage, affords a rich nidus for its reproduction and dissemination in crowded cities.

4. *Nearness to a tropical sea, or to a large river emptying into such sea*.—Yellow fever is almost wholly confined to level districts in large river and sea-port cities of warm climates. The germ travels three times as fast in tropical regions as it does in the outer limits of the fever zone. Its average rate of progress is about forty feet per day.

5. *A deficiency of ozone in the atmosphere*.

The germs—(micrococci?)—of yellow fever being portable, may be conveyed in baggage or merchandise (fomites) along the routes of travel from infected to non-infected districts. Unless so conveyed, as their progress is naturally very slow, the infection may be confined to a single block or district of a city. (This fact alone must always render judicious quarantine of vital importance). They are commonly most active near the surface of the earth, and at night. They may be dormant for many years consecutively, only requiring a concurrence of causes to arouse them to disease producing activity. Few germs survive a temperature below 32° Fahr. and all perish at 212° Fahr.

Epidemics of yellow fever are self-limited and seldom continue longer than from sixty to seventy days. They usually appear in this country in July or August and disappear upon the advent of frost. Malignant intermittent fevers frequently precede outbreaks of yellow fever epidemics. South and easterly winds favor the development of the disease, while north and west winds tend to arrest it. Negroes are most exempt from its attacks. Having had the disease is a partial protection against a recurrence. A prolonged residence in a yellow fever district also renders the individual less susceptible. This diminished susceptibility will, however, last only while the individual remains

constantly in the yellow fever region. And acclimation is never complete until the disease has been experienced. Cooks, bakers and blacksmiths, and such as work over fire are specially predisposed to yellow fever, while scavengers, tanners and butchers, are from their occupation, afforded partial immunity. In some epidemics domestic animals have sickened and died from the infection.

Touching the question of contagion or non-contagion, which has given rise to much bitter discussion, I must say to you, that the weight of opinion and of evidence is decidedly against the theory of personal contagion. Dr. Lawson writes, it is worthy of observation that the great majority of the members of the profession who have resided some years in the tropics and had constant experience of yellow fever, entertain the opinion of non-contagion, and it is only among those who have met the disease occasionally, or who have never been brought in contact with it, that the idea of contagion is generally received.

In summing up the etiology of yellow fever we arrive legitimately at the following conclusions:

1. The disease is produced by a specific germ.
2. The impression on the organism is as specific as that produced by typhoid fever.
3. An attack affords partial protection from subsequent attacks.
4. The white population of sanguine temperament suffer most severely, while the blacks are partially exempt.
5. The germs have the power of self-reproduction outside the body, under favorable local and meteorological conditions.
6. A temperature below 72° Fahr. is unfavorable to the propagation of germs.
7. The disease is not personally contagious, because of the immature state of the germinal principle contained in the exhalations and discharges of the sick.
8. The germs may be conveyed from infected to non-infected districts by fomites.
9. The period of incubation of the germ is from two to nine days.
10. The average length of an epidemic is from sixty to seventy days.

Clinical History.—The clinical history embraces a description of the prodromal stage, the stage of initial fever or the paroxysm proper, and the period of sequels which includes the stages of calm and of reactionary fever.

The period of incubation of yellow fever—the time which elapses between the absorption of the poison by the organism, and the appearance of the first signs of the disease—varies from a few hours to several days or even weeks. Its average length is from one to two or three days. Prodromal phenomena similar to those observed in other infectious diseases, and consisting of a general feeling of uneasiness or discomfort, headache, pains in the limbs, and loss of appetite, occasionally precede the attack. Usually, however, the onset is apparently abrupt, the disease taking the patient by surprise, either in the morning, while engaged in business, or during sleep.

The paroxysm.—In most cases the ushering in symptom, which marks the beginning of the *stage of initial fever*, is a chilly feeling along the spine passing into actual rigor. Immediately the patient feels seriously ill, complains of stinging pains in the forehead and temples, as also of pains in the back and limbs, and more especially in the calves of the legs. Soon the sensation of cold alternates with, and rapidly gives way to one of heat. The patient becomes restless, and presents an appearance of alarm and anxiety. The countenance is flushed, the conjunctiva intensely congested, and the eye has a peculiar muddy appearance. The tongue is covered by a white or thin yellowish fur, and is scarlet colored at the tip and edges. The fauces appear bright red and oedematous. The skin becomes hot, and is either dry or bathed in profuse perspiration. Frequently, as early as the second day it emits a peculiar *cadaveric odor*. The temperature rises rapidly and often reaches 102° Fahr. or 104° Fahr. within a few hours after the chill. The respiration is hurried and frequently irregular. The pulse is full and hard, averaging from one hundred to one hundred and ten beats per minute. The epigastrium is extremely sensitive to pressure, and occasionally there is nausea with frequent and unsuccessful attempts at vomiting. The bowels are usually constipated; if discharges occur they are dark colored and offensive. On the second day, in those exceptional cases which assume the *ephemeral form*, after some free alvine or urinary evacuations, the pulse and tem-

perature may suddenly fall, the fever speedily subside, and the patient enter upon a rapid convalescence. Such a course is, however, by no means common, for in the majority of instances the febrile movement continues to the third or fourth day. The temperature then usually reaches its maximum height on the evening of the second, which in this country rarely exceeds 104° Fahr. In rare cases the thermometer has been known to register 105° Fahr. or even 107° Fahr. The pulse generally falls after the second day, with a progressively increasing rapidity, and on the fourth day oscillates toward eighty. The mind is usually clear, but occasionally delirium makes its appearance on the second day. In mild cases this delirium may be confined to irrational utterances, while in severe cases it may become so violent as to render physical restraint necessary. In fatal cases delirium is rarely absent. Usually on the morning of the third day, but frequently not before the fourth or fifth day, the febrile storm commences to subside. After some free evacuation of the bowels or bladder, the temperature begins to fall, and the pulse continues its steady downward course begun on the second day. All the symptoms abate except the epigastric tenderness. The patient sits up and feels better; and in favorable cases convalescence now commences.

The stage of calm.—Much more often the defervescence is not complete, the temperature does not fall below 100° Fahr. and the patient has simply passed into that deceptive *first period of sequel*—the stage of calm. The duration of this so-called second stage is very short, rarely exceeding from two to three or at the utmost twenty-four hours. Graver symptoms of a typhoid character now appear, and the patient approaches the third stage of the disease,—the second sequel—the stage of reactionary fever.

The stage of reactionary fever.—The temperature which had commenced to fall rises again rapidly, and after two days reaches 104° Fahr. The pulse becomes quick, at times slow, but always small and thready. The stomach becomes more irritable, and rejects all food and drink. The conjunctiva presents a yellowish appearance—sometimes even as early as the third day. The skin, in about one-sixth of the cases, assumes an icteroid hue, which is especially marked about the face, neck and shoulders. The tongue is dry and covered with a dirty brownish fur; the gums are of a purplish color. The nervous restlessness and the

delirium return, or else the patient lies in a state of complete apathy and unconcern. Frequently muscular spasms and sub-sultus tendinum occur. The urine is scanty, of a sulphur or saffron yellow color, and contains—after the fifth day—granular tube casts. The distress and burning in the epigastrium become more and more severe. As the vomiting continues, flakes of black hemorrhagic matter mixed with a thin mucoid fluid, and known as *black vomit* are ejected. The vomiting now is somewhat peculiar in that it is *projectile* in character. It may occur on the second or third day of the fever, but more commonly it does not come on until thirty-six or forty-eight hours before death. The ejection of the black vomit, though prostrating to the patient, often relieves the sensation of pressure or tightness over the epigastrium.

Black vomit.—When allowed to stand, black vomit separates into a thin mucoid fluid and a solid substance resembling coffee-grounds. The mucoid fluid is made up mainly of water mixed with the mucous secretion of the stomach. The solid matters of the vomit consist of colorless blood globules, epithelium, disintegrated matters of food, and free hæmoglobin or hæmatin in the form of yellow amorphous patches. Frequently zooglœa of micrococcus are observed in fresh specimens. And very often specimens of the yeast plant or cryptococcus cerevisiæ are found.

If the disease is to take a favorable turn, usually after a continuance of twelve hours, amid profuse sweats all the symptoms abate, and the fever gradually subsides. The pulse falls again, sometimes as low as forty per minute; and the temperature slowly returns to the normal. The skin becomes moist, and the discoloration fades. The gastric symptoms become greatly diminished; and the delirium disappears. Excessive nervous prostration now remains as the most prominent symptom. As a rule convalescence is tardy, being frequently protracted by such complications as diarrhea, visceral congestions, abscesses, periostitis of the tibia, suppurative parotitis, etc.

In cases which are to terminate fatally, there is no amelioration, the symptoms becoming more and more grave as the disease progresses. The temperature steadily rises, while the pulse frequently sinks. The tongue is hard, dry and covered with a brown or blackish fur. The black vomit increases; and frequent hemorrhages take place from the nose, mouth, kidneys and bowels.

The urine becomes very scanty, albuminous, and at times suppressed. The countenance is sunken, and the face is of a dusky color. The delirium may be either low muttering or active until near the close of life. In severe cases hiccough, clammy sweats, convulsions, and involuntary evacuations precede dissolution. Death most frequently takes place on the fourth, fifth or sixth day. Some epidemics are much more fatal than others. The ratio of mortality is much less during the latter part than during the early part of an epidemic.

Duration.—The average duration of yellow fever is less than one week.

ANALYSIS OF CHART.

The Cutaneous Surface.—The *yellow color* of the skin from which the disease receives its name—*yellow fever*—is reported as being present in not more than one case in six. It seldom appears before the third day. It is first noticed about the eyes, whence it gradually extends downwards over the whole body. The icteroid hue is caused by the staining of the tissues with pigment matter formed from the *lœmatin* during the degenerative changes produced by the action of the yellow fever poison upon the red globules of the blood. This discoloration, therefore, is a real hæmatogenous jaundice, and is not due, as some suppose, to a retention and absorption of the bile.

The *perspiration* becomes especially marked after the first twenty-four hours. In some cases the sweat is so profuse, as to wet, not only the clothing, but also the bedding upon which the patient rests. Along with the sweat, a peculiar, somewhat cadaverous odor is perceived to emanate from the skin and in the breath. Frequently a burning, stinging sensation is imparted to the tips of the fingers, when the moist and feverish skin is touched. In severe cases the face is of a dusky hue, though the skin generally is of an orange-yellow color.

The Digestive Tract.—The *tongue* is early covered by a white cream-like film, except at the tip and edges, which are of a bright scarlet tint. Later it assumes a yellow or brownish tint, and the edges if clean are of a purplish color. In fatal cases towards the close of life it becomes hard, dry, and covered with a brown or blackish fur. There is loss of appetite with nausea and a constant, often unsuccessful, attempt to vomit from

CHART IX.—*Yellow Fever.*

Non-contagious.		Endemic or Epidemic.		Portable.
Incubation.	Twelve hours to five days.			
Periods.	The paroxysm.	The period of sequels.		
Stages:	Stage of initial fever.	Stage of calm.	Stage of reactionary fever.	
Duration:	One to three or four days.	Twelve hours to two days.	Twelve to forty-eight hours.	
Temperature:	104° on second day.	100° Fahr. or normal.	104° Fahr.	
Pulse:	90 to 120, (gaseous.)	Approaches the normal.	90 to 120. Thread-like.	
Skin:	Yellow on third day. Cadaveric odor.	Discoloration subsides.	Orange-yellow color. Profuse sweats precede convalescence.	
Eyes:	Muddy at first, afterwards suffused. Resemble balls of fire.	Subsidence of symptoms.	Red and watery.	
Extremities:	Pain in the back and calves.		Muscular prostration. Pain in back and legs.	
Head:	Supra-orbital headache.	Slight cephalalgia.	Apathy, delirium or stupor.	
Tongue:	White coat. Red edges.	White coating.	Dry, brown, cracked.	
Stomach:	Nausea. Projectile vomiting. Yellow or greenish.	Epigastric tenderness.	Projectile vomiting. Black vomit. Hiccough.	
Bowels:	Constipated.	Constipated.	At times, hemorrhage.	
Urine:	Saffron colored, suppressed.	Increased flow.	Suppressed. Albuminuria.	
Blood:	Serrated globules.	Diminution of fibrin.	Uræmia.	
Kidneys:	Parenchymatous nephritis.			
Liver:	Slightly enlarged.		Fatty degeneration.	
Nervous system:	Inflammation of lumbar arachnoid, and of neurolemma of ganglia of hepatic and celiac plexuses.			
Duration:	Average of disease, 6 days.		Average of epidemic, 60 to 70 days.	
Prognosis:	Mortality varies from 5 to 75 per cent. Most fatal in children.			

the onset of the disease. And generally there is a sensation of dull aching pain or pressure in the epigastrium. Thirst for cold drinks is a prominent symptom.

Vomiting comes on soon after the initial chill, and continues throughout the course of the fever. At first the vomited matters consist of a thin mucoid fluid, of a white and frothy appearance, frequently mixed with bile. Later—usually in the third stage—the mucoid fluid becomes mixed with flakes of black hemorrhagic matter, or even with pure blood. As the vomiting continues, the flakes of black hemorrhagic matter gradually increase in amount, until finally a quantity of them mixed with thin mucoid fluid—and styled the *black vomit*—is thrown up forcibly, and at once. This peculiar vomit, which is brownish-black in appearance, is an almost pathognomonic sign of the disease, and may vary in quantity from a mere stain, to many pints in twenty-four hours. It may occur as early as the second or third day, but usually it does not set in until thirty-six or forty-eight hours before death. Statistics show that it is present in not more than thirty-three per cent of all dying cases. When present it should always be regarded as a grave symptom. Children are more apt to recover after it has occurred, than are grown people. In some cases, black matters resembling black vomit are passed from the bowels, which, otherwise, are constipated. In many instances hiccough appears as the patient approaches collapse. Critical alvine evacuations frequently precede an abatement of febrile symptoms.

The Urine.—Early in the fever the urine has a reddish tint and displays an acid reaction. After the second day it almost invariably contains albumen. Granular tube casts may be discovered on the fifth day. Albumen is found in all fatal cases. In severe cases the urine becomes very scanty, contains a minimum of urea, and may be suppressed from twelve to forty-eight hours. Suppression of urine usually occurs during the latter part of the third stage, and is one of the most dangerous symptoms. When complete it is more unfavorable than the black vomit, as death may speedily ensue from uræmia. Biliary pigment appearing towards the close of the disease is generally considered a favorable symptom.

The Eyes.—At the onset the eyes present a muddy appearance owing to slight cedematous swelling of the conjunctiva.

Later, from increased conjunctival congestion, they become moist, and resemble balls of fire.

The Temperature.—The characteristic symptom as regards temperature in yellow fever is, that the highest point is reached at the outset of the disease. In mild cases the maximum is reached within a few hours after the initial chill, while in protracted cases it is seldom delayed beyond the second or third day. Fig. 13 (p. 207.) represents the temperature curve in typical cases of two, four, and eight days duration.

During the paroxysm the average height reached in the axilla is 104° Fahr. In exceptional cases it may mount to 106° Fahr. or higher. In the stage of calm it falls to 100° Fahr., but rises again to 104° Fahr. or even higher as the patient enters the third stage. After remaining stationary for from twelve to forty-eight hours, it falls to the normal standard, where it remains until convalescence is fully established. A considerable rise in temperature frequently occurs, shortly before death, in fatal cases.

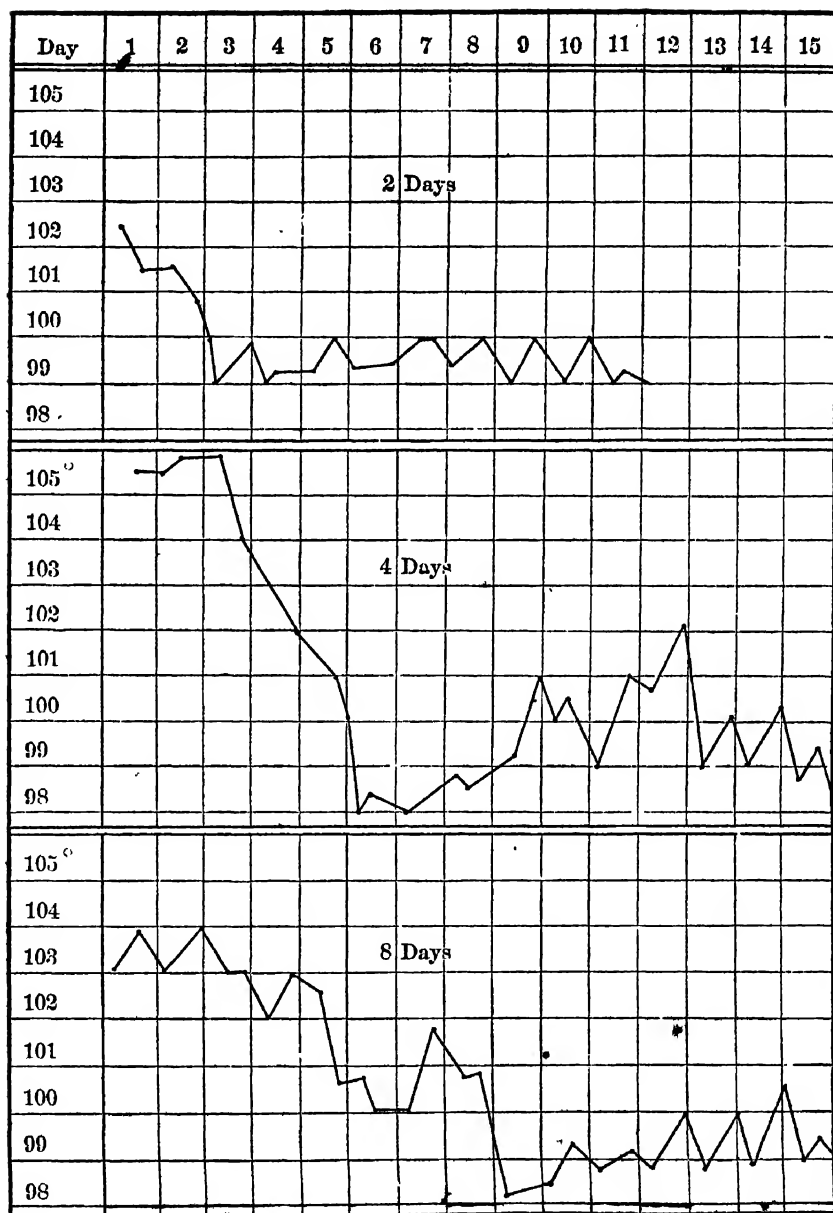
The following table arranged by Sternberg, shows the prognostic value of temperature observations in yellow fever.

Cases having temperature of	No. of Cases.	No. of Deaths.	Percentage of Deaths to Cases.
From 107° and above	13	13	100
106° to 107°	9	9	100
105° — 106°	36	22	61
104° — 105°	80	24	30
103° — 104°	87	6	7
102° — 103°	29	0	—
101° — 102°	15	0	—
Total	269	74	

The Pulse.—The pulse is most rapid at the outset of the fever. Its maximum average—120 beats—is reached on the first day. Immediately afterwards it begins to fall at about the rate of ten beats every twenty-four hours. This steady decline, which begins as early as the second day, when taken in connection with the rise in temperature, is, I would have you remember, one of the most reliable guides in the differential diagnosis of this disease.

The Nervous System.—Slight headache occurs among the early prodromes. Then comes the chill or rigor, followed by general symptoms of hyperæmia of the cerebro-spinal axis, and

FIG. 13.



Temperature Range in typical cases of Yellow Fever, of two, four, and eight days duration (after Sternberg.)

of the sympathetic ganglia of the abdomen and thorax. Mild delirium frequently occurs as early as the second day. In many cases the delirium becomes wild in character, and is marked by a constant desire on the part of the patient to escape. In cases which terminate fatally the delirium usually remains active till death approaches. In the "apoplectic grade" the patients are struck down suddenly, become perfectly comatose, hemorrhages take place, and death speedily ensues. The fatality in most instances is almost always dependent upon hyperæmia of the brain. In cases that recover, excessive nervous prostration, and the general feebleness of the organism render convalescence tardy and oft-times discouraging.

Morbid Anatomy.—The anatomical changes which occur in yellow fever resemble in many respects those of the miasmatic and contagious fevers.

The Liver.—The liver is the seat of the most constant and characteristic lesion of the disease. The typical pathological change is one of *fatty infiltration*, and may involve the whole gland, or be confined to one lobe or to a small portion of a lobe. On section the organ presents a peculiar pale yellow, greenish or blackish-brown appearance. Viewed under the microscope the hepatic cells are observed to be more or less filled with oil globules. Sometimes the pathological changes advance to a true fatty degeneration of the protoplasm of the hepatic cells. In such cases the entire liver cells will appear filled with large fat globules; presenting the condition known as acute fatty degeneration. Very frequently, especially in drunkards, cirrhosis is associated with fatty degeneration.

The Kidneys.—The kidneys are always more or less congested and enlarged, and their pelves are frequently the seat of catarrhal inflammation. In the majority of fatal cases, the leading pathological change consists in a degeneration of the epithelium lining the uriniferous tubules. As a result of the degeneration, numerous so-called albuminous cylinders are formed in the interior of the tubules. The largest of these cylinders are formed in the convoluted portions—the tubuli contorti—and in the intermediate canals. During the metamorphosis larger fat globules are rarely observed.

The suppression of urine which appears in some cases is prob-

ably due to general atrophy and degeneration of the renal epithelium.

The Heart.—In uncomplicated cases the heart is generally found normal in size and form, empty, and firmly contracted. At times it is pale, soft and flabby, and presents changes similar to those found in typhoid fever. The pericardium often contains from one to two ounces of yellow or reddish serum. Partially organized yellowish coagula, resulting from the slowing of the circulation from the feebleness of heart power, are occasionally found in the cavities of the heart.

The Blood.—The fibrin of the blood is diminished in quantity. The colored corpuscles undergo changes which indicate loss of vitality. The white corpuscles are reduced in number, and contain an unusual quantity of fat granules.

When removed from the body, the blood of yellow fever rapidly undergoes ammoniacal changes.

The Brain.—The nervous system is always seriously implicated. The pia mater is almost invariably found in a state of hyperæmia. The arachnoid is frequently found not only opaque but thickened. The brain is congested throughout its whole substance, but more especially in the parietal lobes. The general cerebral hyperæmia depends upon a depression of the vaso-motor nerves, followed by a relaxation of the arterial walls.

Cadaveric rigidity appears early and is strongly marked.

The Stomach.—In almost all cases the mucous membrane of the stomach is found more or less congested. The congestion is confined to smaller or larger spots, and appears mostly along the greater curvature. In fatal cases, small red spots or patches, resembling small ecchymoses or extravasations of blood are found.

The Skin.—The intensity of the color of the skin varies usually in proportion to the severity of the case. It is of an orange-yellow color, and is deepest about the head and trunk, fading towards the feet. Frequently, approaching the end of an epidemic, the discoloration extends only to or slightly below the knees.

In most instances the almost characteristic yellow tint is observed in all the tissues of the body.

LECTURE XIV.

Yellow Fever.—(CONTINUED.)

In the lecture immediately preceding I gave you the main points in the clinical history and morbid anatomy of yellow fever; I will now state, as fully as the limits of the hour will permit, what is at present known concerning its differential diagnosis and treatment.

Differential Diagnosis.—It is almost impossible to make an infallible diagnosis of yellow fever at the outset of the disease, as a number of other infectious maladies approach in a similar manner, and are attended by the same phenomena. On and after the second day, however, the recognition is generally easy. The *falling of the pulse* on the second day, *with a simultaneous rise of the temperature* of the body; the pain in the head, back, and *calves* of the legs; the suffused and watery eye; the presence of albumen in the urine on the third day; the epigastric tenderness; the projectile vomiting; the orange-yellow color of the skin; the *black vomit*; and the short duration of the febrile phenomena, constitute a group of symptoms which are unmistakable. While fatty infiltration of the liver, along with the peculiar spotted congestion of the stomach, and the black vomit, are pathognomonic autopsic phenomena of the disease.

Yellow fever may be confounded with remittent fever, relapsing fever, and acute yellow atrophy of the liver.

Remittent fever is a disease of several paroxysms, prevails in inland towns, and is not portable. Yellow fever is a disease of one paroxysm, prevails in seaports, and is portable. The vomiting is projectile in character in yellow fever; it is non-projectile

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in remittent fever. In yellow fever the pulse after the second day falls while the temperature rises; in remittent fever it rises and falls with the fever heat. The yellow discoloration of the skin appears earlier and is more intense in yellow fever than in remittent fever. The urine is generally albuminous in yellow fever, rarely so in remittent fever. The spleen is but slightly or not at all affected in the former, while it is invariably enlarged in the latter. Black pigment granules (Fig. 9), which are found in the blood in remittent fever, are not seen in yellow fever. One attack of yellow fever affords almost certain immunity, while one of remittent rather predisposes to others. Autopsies show a yellow, fatty liver in yellow fever, and a non-fatty bronzed liver in remittent fever.

Relapsing or *spirillum* fever is contagious. Yellow fever is non-contagious. The discoloration of the skin in relapsing fever seldom appears before the relapse, while in yellow fever it frequently appears about the third day. Spirilla are found in the blood of the former, but not in that of the latter. The spleen which usually remains unaltered in yellow fever is as a rule enlarged in relapsing fever.

Acute yellow atrophy of the liver may be differentiated from yellow fever by its history and by the steady diminution in size of the organ.

Prognosis.—The prognosis is much more favorable under homœopathic than under old school treatment; as under the former the mortality is from *five to twelve per cent*; while under the latter it ranges from *fifteen to seventy-five per cent*. It varies greatly in different epidemics, and at different periods of the same epidemic. It is favorable when the febrile paroxysm is long and moderate, and when the albuminous urine does not contain casts. It should be guarded in new comers, and when the temperature runs high, the stomach is irritable, or the urine becomes scanty and contains albumen and casts. It is always grave when black vomit and urinary suppression supervene. According to statistics recovery is more frequent after the occurrence of black vomit, than after suppression of urine. Coma and convulsions are usually fatal symptoms dependent on uræmia.

Treatment.—*Prophylaxis.*—In the prevention of yellow fever your attention must be directed in the first place to the interception of its new importation, and in the second place to the

thwarting of its spreading after it has once made its appearance. A properly regulated and executed system of *quarantine* will—as far as is possible—prevent the early introduction of the specific poison. And further, local hygiene and the best sanitary measures, are of almost equal importance with quarantine in checking the spread of imported yellow fever, and are of absolute necessity in the prevention of that of domestic origin. For importation of the morbid agent is not always necessary, as germs may be perpetuated, from epidemics of previous years, through the winter months, to break forth as soon as the intense heats of summer come to recuperate them, and enable them to develop and multiply.

The question of yellow fever quarantine is a very vexed one. And as many of the best physicians entertain entirely different views, it will be of little use to discuss the matter here. Suffice it to say that most exhaustive papers on the subject are contained in the Report of the Bureau of Sanitary Science to the American Institute of Homœopathy at its thirty-third session, in 1880.

All vessels arriving from yellow fever ports, during summer months, near ports liable to it, should be inspected, and undergo thorough cleansing and disinfection. If found to be infected, such vessel or vessels should be quarantined until a thorough disinfection of the clothes and effects of sailors and passengers, together with the cabins and general hold of the ship or ships has been obtained. (Personal detention, other than of those ill, is seldom necessary.) The clothes of passengers may be readily disinfected by dry heat, as most germs of disease become innocuous with a temperature of 212° Fahr. The deck and wood-work should be washed in carbolized water, and the ship thoroughly disinfected with either chlorine or sulphur dioxide. The space to be disinfected must be kept saturated with the gas for not less than one hour.

As yellow fever usually proceeds along the highways of travel, cities and towns located within the fever zone, should quarantine against infected districts. Non-infected wards of a city or town should also institute quarantine regulation against infected ones, as the immediate limits of the disease may mostly be measured by fractions of a square mile. Camps of refuge should, when possible, be provided at convenient distances—say five or ten miles—from the city or town infected. Every sporadic case of

yellow fever occurring in cities should be sent at once to the quarantine hospital for treatment.

In the midst of an epidemic, depopulation of rooms and avoidance of confined areas of stagnant air, afford the safest personal prophylaxis. People should live in the open air. The city should be kept in the best sanitary condition, and no animal matter should be allowed to decay within its limits. Personal contact with any one after the fever rises, and until it ceases, should be avoided. *Cimicifuga* and *crotalus* are recommended as preventives. In the sick room free ventilation, cleanliness, and other sanitary measures are of the utmost importance. All excreta and vomited matters should be placed in earthen vessels and thoroughly disinfected—without delay—before being thrown out. Platt's chlorides should be sprinkled around the room and on the bed-clothing. All the bedding, together with the bed and body linen should be burned as soon as the patient is in convalescence. Woolen articles may be disinfected by heat at a temperature slightly above 212° Fahr. All other articles that will stand boiling and washing with carbolized water and soap, should undergo the process. After the patient has either recovered or died, the room should be well and completely ventilated, disinfected with sulphur dioxide, or frozen out—and this must be for at least seven consecutive days. The floors and wood-work of the apartment should be washed, and the walls whitewashed, or if already papered, thoroughly disinfected. That method of aerial disinfection which as formerly practiced, simply consists in making the air of a room smell strongly of carbolic acid, by scattering carbolic powder on the floor, or of chlorine by placing a saucer of chloride of lime in one corner of the apartment, is a delusion, and as far as the destruction of specific germs is concerned is perfectly useless.

No one should, after leaving, return to an infected district, until at least four weeks after the last case, or after a seven days' freeze.

Principal Remedies.—The most important remedies during the cold period of the first stage are: *Tinct. of camphor*, and *veratrum alb.* As soon as a reaction appears, and, in general terms, during the first twenty-four hours thereafter, *aconite* is indicated. During the second twenty-four, *belladonna* is usually the remedy, and during the third, *bryonia*. *Veratrum viride* is

occasionally of service. *Gelsemium* and *eupatoriun perf.* vie with the foregoing remedies in the stage of initial fever, especially if malarial complications exist. *Quinine* may also prove of service in such cases, particularly when prostration begins to appear, and when in consequence of malarial influences fatal congestions threaten. It should be administered hypodermatically and in appreciable doses, as suggested in a former lecture on Pernicious Fever (p. 99).

Arsenicum alb. will be your main reliance in the stage of calm, although possibly if malarial influences predominate it may give way to either *cinchona* or *natrum murialicum*.

During the stage of reactionary fever, *arsenicum* is the remedy, par excellence. After it comes *lachesis* or possibly *crotalus*. In typhoid states either *rhus tox.* or *arnica* may be indicated. And in collapse you will need either *arsenicum*, *crotalus*, *carbo veg.*, or *hydrocyanic acid*. *Calcareo carb.*, or *cinchona* may *prove serviceable during convalescence.

As intercurrent remedies, you will think of:—

Bell., *caffeine*, *hyosc.* or *potassium bromide* (per rectum), for the insomnia and nervous agitation. *Ipecac* for obstinate vomiting in the first stage, and *sulpho-carbolate of soda*, in from two to five-grain doses when it occurs in the last stage. *Verat. alb.* for vomiting with abdominal pain and great prostration. *Tartar emet.* when there is prolonged and distressing nausea in the third stage. *Argentum nit.*, *arsenicum*, or *cadmium sulphate* for the black vomit. *Mercurius* or *colocynth*, when either diarrhea or dysentery supervene. *Millefolium* or *gallic acid* for hemorrhage from the mouth and gums. *Argent. nit.*, *ars. alb.*, *crotalus*, *sulphuric acid* or *phos.* for hemorrhage from the intestinal canal. *Lycopodium*, *terebinthina* or *erigeron* for hemorrhage from the kidneys or bladder. *Sabina* for either uterine hemorrhage or threatened abortion. *Enonymin*, *helonin*, *merc. cor.*, or *cuprum*. for albuminuria. *Opium* or *hyosc.* for urinary retention. *Cantharis* or *apis* for difficult urination, with scanty discharge, and *cucumis citrullus*—a decoction of watermelon seeds—in urinary suppression when other remedies fail.

Leading Indications.—The following are the guiding symptoms for the different remedies:—

Aconite.—Excessive restlessness and anxiety. Great timidity; fear of approaching death. Vertigo on rising. Burning head-

ache. Pain in the forehead and temples. Face dark red; on rising turns deadly pale. Eyes injected and sensitive to light. Great sensitiveness to every noise. Epistaxis. Dryness of the mouth and lips. Thirst for large quantities of water. Burning and numbness in the throat. Nausea, vomiting and painful hic-cough. Heat and tenderness of the epigastrium. Pain in the back and extremities. Painful, anxious urging to urinate. Great weariness and loss of strength.

Apis mel.—Absent mindedness and indifference. Headache, pain in the forehead and temples relieved by pressure. Red, hot, swollen face. Dryness of the tongue, scalding in the mouth and throat. Dysphagia. Suppression of urine. Strangury, or else urine scanty and high colored. Great desire to sleep.

Argentum nit.—Headache, with boring in left frontal eminence, relieved by pressure. Intolerance of light. Conjunctiva pink or scarlet-red. Yellow, dirty-looking face. Tender, easily bleeding gums. Throat dark red. Black vomit. Tremulous weakness. Convulsions preceded by great restlessness. Sense of expansion of the body, particularly of the face and head.

Arsenicum alb.—Great restlessness and anxiety, especially at night. Dread of death. Delirium with desire to escape. Intense, dull or throbbing pain in the head. Excessive photophobia. Yellowness of the conjunctiva. Dark rings around the eyes. Yellow or livid face. Dry, brown or black tongue. Violent thirst; drinks little but often. Vomiting, especially after drinking. Great anxiety in the epigastrium. Black vomit. Violent burning pains in the abdomen with intolerable anguish. Black, putrid, bloody stools. Suppression or retention of urine. Involuntary urination. Bloody urine. Oppression of the chest with short, anxious breathing. Irregular, small, scarcely perceptible pulse. Bruised pain in the small of the back. Drawing pains in the legs. Sudden sinking of strength. Coldness of the body, with internal burning heat. Cold, clammy sweat.

Baptisia.—General indisposition. Confusion of mind. Frontal headache with pressure. Lameness and soreness of eyeballs on moving. Dark, red, besotted expression. Dryness of the mouth and tongue. Foetid breath; difficult deglutition. Dark red scanty urine. Severe aching pain in the back and hips.

Tired, bruised, sick feeling all over. Delirious stupor. Symptoms worse from evening until midnight.

Belladonna.—Great anxiety and restlessness, with desire to escape. Vertigo on turning over in bed. Nervous excitement with delirium. Cephalalgia with throbbing of the carotids. Pain relieved by pressing strongly on the forehead. Red, swollen, staring eyes; intolerance of light; dilated or oscillating pupils. Red halo around the light. Bright red, swollen face. Dryness of the mouth, tongue and throat. Burning and throbbing in the stomach, with excessive thirst for cold water. Retention of urine. Menses too early and too profuse. Dry, burning heat with changing pulse. Pain in the back, loins and extremities. Intense burning heat within and without. In plethoric individuals.

Bryonia.—Irritable mental state. Sensation as if sinking deep down in bed. Headache from the occiput down to the neck and shoulders, as if head would split, worse from motion. Pain, especially in the left eyeball, aggravated by motion. Dark red puffy face. Great dryness of the mouth and tongue. Thick white or brownish coating on the tongue. Bitter, sour taste. Excessive thirst for large quantities of water. Fullness and pressure in the epigastric region. Vertigo or nausea on sitting up. Dark, almost brown, scanty urine. Full, hard, rapid pulse. Pain in the back, limbs, and abdomen. Worse in warm weather after cold days.

Cadmium sulph.—Vertigo, nausea, pitch-like taste in the mouth; salty, rancid eructations. Burning and cutting in the stomach; vomiting of sour, yellowish or blackish fluid. Pain in the abdomen. Cold sweat on the face.

Camphor.—Severe and long-lasting chill. Great anxiety and restlessness. Pale, anxious expression. Weak, scarcely perceptible pulse. Icy coldness of the whole body. Cold, clammy sweat. Internal trembling; great prostration.

Cantharis.—Insensibility. Yellowness of the conjunctiva. Suppression or retention of urine. Bloody, turbid, scanty urine. Pain in the loins, kidneys and abdomen. Tearing in the limbs; cold sweat on the hands and feet. Hemorrhage from the stomach and bowels. Convulsions with dysuric and hydrophobic symptoms.

Carbo. veg.—Great restlessness; icy coldness of the whole body. Pale, greenish-yellow color of the face; hippocratic countenance. Pressive headache above the eyes. Pupils insensible to light. Severe and oft-repeated nosebleed. Dryness and rawness of the tip of the tongue. Sour, rancid eructations; burning and sensitiveness in the epigastrium with vomiting of blood. Flatulence; putrid, cadaverous, involuntary evacuations. Dark red, bloody urine. Difficult breathing; desire to be fanned. Weak, small, thread-like pulse; cyanosis. Coldness of the breath; cold sweat upon the limbs. Ecchymoses.

Cimicifuga.—Melancholy; fear of death; indifferent. Excessive pain behind the right orbit. Delirium, dreams about negroes, devils, etc. Violent pains in neck and back. Excessive muscular soreness. Weakness, trembling and spasmodic action of the muscles. Obstinate sleeplessness; waking from sleep with a start. Alternate tonic and clonic spasms.

Colocynth.—Dark redness of the face. Colic pains, relieved by pressure. Frequent urging to urinate with scanty urination. Drawing pain in the right thigh, down to the knee. Cramp in the left calf. Tendency to cramp in all muscles of the body. Night sweat smelling like urine.

Crotalus.—Delirium with open eyes; utter apathy. Intense headache; with red, puffed face. Hemorrhage from all the orifices of the body. Bloody sweat. Deep yellow color of the whole cutaneous surface; ecchymoses. Coldness of the skin. Pulse either slow or rapid and scarcely perceptible. Extreme depression of vital powers. Weak, hoarse, rough voice. Sour, acrid, eructations, nausea; bilious or bloody vomiting; bloody, sometimes involuntary stools. Painful retention of urine.

Cuprum acet.—Anguish with great restlessness. Convulsive and restless movements of the eyes. Blueness of the face and lips. Gurgling on swallowing. Excessive nausea; violent vomiting; with pressure on the stomach, aggravated by touch and motion; bloody vomiting. Spasmodic contraction of the abdominal muscles. Spasms and cramps in the calves. Clonic spasms.

Eupatorium perf.—Headache, with sore feeling internally. Soreness of the eyeballs, with intolerance of light. Nausea with retching and vomiting of bile. Aching pain in the back,

as from a bruise. The bones ache as if broken. Trembling and nausea from the slightest motion.

Gelsemium.—Dullness of the mental faculties. Vertigo with loss of sight; blurred vision. Fullness of the head, with heat in the face and chilliness. Heavy, dull, besotted expression. Thick, yellowish-white coated tongue; difficult deglutition; fetid breath. Frequent, soft, almost imperceptible pulse. Trembling in all the limbs. Loss of muscular power in the legs. Sleeplessness; becomes delirious on falling asleep.

Hyoscyamus.—Delirium and restlessness. Picking at the bedclothes. Pressing pain in the forehead; undulating sensation in the brain. Red and sparkling eyes; dilated pupils. Dark red bloated face. Retching and vomiting; hiccough; tenderness over the epigastrium. Involuntary nocturnal stools; retention of urine. Convulsions; *sleeplessness* from excessive nervous excitement; wakes up with a cry.

Ipecac.—Paleness and puffiness of the face; blue rings around the eyes. Vertigo, with chilliness and pain in the back and limbs. Distressing nausea, vomiting, predominance of gastric symptoms. Great weakness and anxiety.

Lachesis.—Nightly delirium; vertigo in the morning on awaking. Headache over the eyes and in the occiput; pressive headache with nausea. Rush of blood to the head with redness of the face; bursting pains in the temples. Yellowness of the conjunctiva; dimness of vision; black flickering before the eyes. Tongue, mouth and lips are red, dry and parched. Tongue is heavy and trembles when protruded. Neck sensitive to the touch. Sour eructations; nausea after drinking; stomach sensitive to pressure. Foaming, almost black urine. Oppression of the chest with shortness of breath. Irregular, weak pulse; palpitation of the heart; cramp-like pain in the precordial region. Sleepiness with inability to sleep; tossing and moving during sleep; symptoms worse after sleep. Great physical and mental exhaustion; attacks of suffocation. Perspiration at night; the sweat stains the linen yellow. The blood is dark and non-coagulable; small wounds bleed much, sore spots have a dark red, brownish appearance.

Lycopodium.—Depression of spirits, with great anxiety. Pressing or tearing frontal headache; worse from 4 to 8 p. m. Yellow-

ish-gray color of the face. Gums bleed from the slightest touch; vesicles on the tongue. Acrid eructations; pressure and heaviness in the stomach; hiccough. Flatulent distension of the abdomen. Severe backache; frequent desire to urinate; hemorrhage from the kidneys and bladder. Shortness of breath, especially during sleep; soporous sleep.

Mercurius.—Great anxiety and restlessness; weakness of memory; and moroseness. Vertigo with violent headache; pressive pain in the left temple. Eyes red, inflamed, and sensitive to light, especially fire-light. Puffiness of the face; dirty yellow skin. Hemorrhage from the gums; fetid odor from the mouth. Tongue swollen, coated white, and showing the imprints of the teeth; profuse salivation. Region of the liver swollen and sensitive to pressure. Violent thirst, with vomiting of slime and bilious matter. Dark red, turbid urine. Weakness and weariness in all the limbs; coldness of the extremities. Glandular swellings. Perspiration stains the linen yellow.

Nux vom.—Extreme sensitiveness to external impressions; great anxiety. Headache, with tension in the forehead, worse in the morning before opening the eyes. Eyes injected, yellow, and watery. Yellowness of the skin; paleness or yellowness of the face. Heaviness of the tongue with difficult speech; dryness of the mouth; accumulation of mucus in the throat. Thirst for beer or stimulating drinks; tension and fullness in the epigastrium; violent hiccough; bitter, sour eructations. Contractions of the abdominal muscles; small, slimy, bilious or bloody stools. Burning pain in the neck of the bladder, with difficult urination. Convulsions; cramps in different parts of the body.

Phosphorus.—Great indisposition; inability to think; low muttering delirium. Dull, pressive frontal headache; throbbing pain in the temples. Face puffy, and of a yellowish hue; blue rings around the eyes. Dry, red or black tongue. Constant nausea; vomiting of food and of blood, mingled with bile and mucus. Oppression and burning in the epigastrium. Hemorrhages from various orifices of the body. Hæmaturia. Ecchymoses. Petechiæ.

Rhus tox.—Anxiety with great restlessness; apprehensive, with inclination to weep. Talkative delirium, or coma with rattling respiration. Dirty yellow color of the skin; sunken face;

glassy eyes; dry, red and cracked tongue. Dryness of the throat, with great thirst for cold water or cold milk. Eructations and rumbling in the abdomen, causing great distress. Pressure and burning in the stomach with nausea and vomiting. Dark, brown stools, mixed with blood. Hot, scanty, high-colored urine. Aching pains in the back and legs; constant restlessness and tossing about. Sleeplessness.

Tartar emet.—Headache as from a band compressing the forehead. Red, or white and pasty tongue. Continuous nausea with great anxiety; intense and long-lasting vomiting; absence of thirst. Dark, reddish-brown, turbid urine; scanty urination. Rapid, weak, trembling pulse. Great weakness, with trembling of the whole body. Great sleepiness.

Terebinthina.—Headache with intense pressure and fullness of the head. Tongue red, smooth and glossy. Vomiting of mucus, bile or blood; severe burning pain with excessive distension of the abdomen. Gripping, pinching colic, with muco-purulent stools. Small, weak, thready pulse. Cold, clammy sweat, all over the body. Burning, drawing pains in the kidneys, with bloody urine. Strangury. Great prostration.

Veratrum alb.—Anxiety and oppression of spirits. Vertigo with cold perspiration on the forehead; coldness and pressure on the vertex. Face pale, or yellowish, cold and sunken; hippocratic countenance. Eyes dull, yellowish and watery; surrounded by blue or black rings. Dryness of the mouth and palate; coldness of the tongue; difficult swallowing; hiccough. Violent, forcible, excessive vomiting; vomiting of bile and blood. Great thirst, especially for cold water. Thin, blackish or yellowish, involuntary stools. Suppression of urine. Difficult respiration, with tightness and constriction of the chest. Small, scarcely perceptible intermittent pulse. Icy coldness of the hands and feet. Extreme weakness and prostration. After over-dosing with castor oil.

Veratrum vir.—Severe frontal headache with vomiting; headache proceeding from the nape of the neck. Intense fever, with flushed face and convulsive twitchings of the facial muscles. Dryness of the mouth and lips; tongue feels as if scalded, and is red in the middle and yellow at the edges. Violent nausea and vomiting with pain in the epigastrium. Cramps of the

extremities. Coldness of the whole body. Threatened convulsions, especially in children.

HYGIENIC AND DIETETIC TREATMENT.

The hygienic and dietetic treatment of yellow fever is almost as essential as is the medicinal. The sick-room should be large, well lighted and well ventilated. As soon as the first symptoms of the disease appear, the patient should be put to bed and kept in a state of perfect mental and bodily rest. One or two trusty friends may be selected as nurses, but all unnecessary visiting or going to and fro in the sick-chamber must be strictly forbidden. Platt's chlorides, thymol or some other disinfectant should be sprinkled upon the bed and about the room, several times a day.

During the first twenty-four hours if the temperature exceeds 104° Fahr., the cold bath may be used. After this time frequent sponging of the body, under the bedclothes, with whisky and water is preferable. In the beginning of the disease the hot foot-bath is quieting to the system and may prove advantageous. Copious enemata should be administered at the outset, every four or six hours, until two or three satisfactory discharges are obtained. Broken ice held in the mouth, will generally allay the distressing thirst, and is often very refreshing to the feverish patient. An infusion of orange leaves is a standard drink; it has a soothing and slightly diaphoretic influence. After the third or fourth day, milk and lime water or chicken broth may be given every two or three hours. When the stomach is very irritable, rectal alimentation should be resorted to. Daily enemas tend to remove the intestinal flatus and almost always relieve the vomiting. Hot water fomentations are of service when pains in the bowels appear, and are excruciating and persistent. Lumbar pain and threatened urinary suppression may be relieved by turpentine stupes. Ice-water injections into the rectum are sometimes successful in relieving urinary retention, but usually this is best accomplished by the use of the catheter.

Stimulants are always needed in collapse, and in the sinking spells of nervous prostration following the disappearance of the fever. They may be used on the third day of the disease, or earlier if indicated. When called for, tablespoonful doses of iced champagne or teaspoonful doses of brandy may be administered every hour. When the stomach is very irritable, injec-

tions of beef-tea and brandy must be given. Later, after the irritability of the stomach has disappeared, milk-punch, ale or porter will prove useful. Indigestible food must be guarded against for some time after convalescence appears to be fully established.

LECTURE XV.

Cerebro-Spinal Fever.

Definition.—Cerebro-spinal fever may be defined as a malignant, non-contagious, febrile affection of indefinite duration, due to an unknown external specific cause, and assuming a variety of forms, marked by local manifestations which pertain chiefly to the cerebro-spinal axis, usually prevailing in general or limited epidemics. It is characterized by sudden invasion; by intense headache, uncontrollable vomiting, and painful contraction of the post-cervical muscles; by cutaneous hyperæsthesia, and frequently by a rash mostly herpetic and petechial; by active delirium alternating with stupor, or stupor deepening into coma; and by bi-lateral deafness, great nervous depression and motor paralysis. Nearly half the cases die, and mostly from failure of the respiratory nerve centers; those who survive three days, have a fair chance for recovery. After death, constant lesions of the pia mater of the brain and spinal cord are found. Relapses are common.

Synonyms.—Epidemic cerebro-spinal meningitis. Cerebro-spinal typhus. Malignant purpuric fever. Petechial fever. Spotted fever. Congestive fever. Tetanoid fever.

History.—This disease doubtless prevailed in Europe as early as the fourteenth century, but was erroneously described as a variety of typhus until shortly after the beginning of the present century. The first of the circumscribed epidemics which appeared nearly simultaneously in Europe and in the United States, started at Geneva, in Switzerland, in 1805, and at Med-

field, Mass., in 1806. For ten years following this outbreak, it prevailed either sporadically or in limited epidemics on both continents. In 1822 it appeared in Vesoul, France, and in 1823 at Middletown, Conn., but was of short duration. Germany was visited for the first time in the winter of 1822-23. After a long interval the fever again appeared in Europe in the early part of 1837, and prevailed every year thereafter, till 1850, in many places, from the Mediterranean to the Baltic sea. Between 1840 and 1850 it was epidemic in nearly all the states of this country from the gulf coast to the Dominion of Canada. From 1854 to 1861, it was epidemic in Sweden, and from 1859 to 1860 in Norway. In 1866 a most destructive outbreak appeared in England and Ireland. In 1860 the disease reappeared in this country, and prevailed with great intensity among the troops during the civil war. A transient epidemic occurred in Canada in 1870, and it prevailed quite extensively in New York. Since 1873 it has not appeared here as an epidemic. It has never appeared within the tropics. The greatest number of epidemics have lasted from three to six months. And usually the fatality is in inverse ratio to the duration of the epidemic. Cerebro-spinal fever is by no means limited to the human race. On the contrary, it frequently becomes epidemic among the lower animals.

Etiology.—The causes of this disease are of two kinds: *predisposing* and *exciting*.

1. *The predisposing causes.*—Age being the most prominent, merits first mention as a predisposing cause. The fever is by far the most common in the first two decades of life; the liability being greatest after seven years of age. The death rate is higher during childhood than at any other period. After middle life there is nearly an immunity.

The seasons exert considerable influence upon the spread of the disease. Epidemics occur oftener in the winter and spring than during the summer months, and generally low temperatures are favorable to the existence and spread of the fever poison.

Modes of life have much to do with the development and prevalence of the fever. It occurs largely among those who by reason of poverty or other cause, are subjected to privations under unfavorable hygienic conditions. Damp, over-crowded,

badly-ventilated, and unclean habitations, especially favor it. Invalids are not particularly predisposed; on the other hand, those attacked are frequently healthy and robust. Over-work, excitement, mental and bodily fatigue, combined with irregularity in eating, renders the system extremely susceptible. Statistics show that active military life is a powerful causative condition.

2. *The exciting cause.*—The exciting cause of cerebro-spinal fever remains as yet unknown, although it is generally believed to be atmospheric. Ziemssen speaks of it as a morbid germ, which primarily arises in the human body, and infects healthy neighbors only when it has undergone a certain, still unknown, modification by means of cultivation in suitable intermediate individuals. The theory of its parasitic origin has received considerable impetus from the recent discovery of bacterial forms—*schizomycetes*—in the pia mater after death. Cerebro-spinal fever is generally believed to be non-contagious.

Varieties.—This “chameleon-like disorder,” as Stille has been pleased to term it, admits of classification into the following four varieties:—

1. *The simple or ordinary variety*, which represents the general course of the disease, and which will be fully described in the clinical history.

2. *The abortive variety*, which occurs at the height and during the decline of all epidemics; is characterized by headache, spinal stiffness, malaise, and, as a rule, absence of fever; and rarely lasts longer than from five to seven days.

3. *The intermittent variety*, which is characterized by intermissions and exacerbations, the disease assuming the quotidian or tertian type. The intermittency frequently lasts for weeks, and suddenly terminates either in death or recovery.

4. *The fulminant variety*, which occurs with greatest frequency at the beginning of epidemics, and which generally terminates in death within a few hours. In this fatal form of the disease, the onset is sudden, usually with a violent, shaking chill. Immediately, the patient becomes cyanosed, and the skin cold and shrunk. There is contraction of the neck, and purpuric blotches appear on the surface of the body. The urine is scanty and loaded with albumen. The respirations are slow and labored,

and the pulse becomes rapid and faint. The headache alternates with drowsiness, and rapidly gives way to coma and death.

Clinical History.—Cerebro-spinal fever, though occasionally preceded by a prodromal stage, of from a few hours to several days duration, marked by chilliness, headache, muscular pains and general languor, ordinarily begins abruptly with chilliness or a distinct chill, followed immediately by pronounced symptoms. In children a convulsion frequently takes the place of the chill. The patient at once takes to the bed, is restless and complains of violent headache, vertigo, and vomiting, especially on rising, with slight nausea. During the intervals of vomiting a sensation of depression or faintness in the epigastrium is frequently experienced. The face is usually pale or cyanotic, the countenance distressed, the conjunctiva injected, and the pupils abnormally dilated. Dragging pains are soon experienced in the neck, along the spine, and in one or both extremities; and are rapidly followed by *tonic contraction of the post-cervical muscles*. At times this muscular contraction extends to the muscles of the trunk, abdomen and lower extremities. The patient lies with the head drawn back, the spine rigid, straightened—orthotonos—or curved—sometimes into complete opisthotonos—and with the arms, thighs, and legs flexed. The entire cutaneous surface, but more especially the skin of the face, forehead and neck, is extremely sensitive to touch and pressure. Intense sickening neuralgic pains in the chest and abdomen frequently occur. There is loss of taste, and the tongue is covered with a thin, whitish fur; exceptionally it is dry and brownish. In addition, there is extreme sensitiveness to light and noise. As the disease progresses the intense headache alternates with or gives way to passive or active delirium, which in a short time passes into coma.

The fever is atypical and irregular, and usually reaches its maximum—105° Fahr. to 107° Fahr.—in the first days of the disease. The temperature of the extremities is extremely variable; more so than in any other affection. The pulse may be either normal, rapid, or only moderately quickened. Its remarkable variation as to frequency and tension is almost characteristic. The respirations are at first quickened; later they may become intermittent, sighing, and irregular. In fatal cases they may

present that alternation of respirations with respiratory pauses, known as Cheyne-Stokes respiration.

After the first few days, herpetic spots are apt to appear upon the face, especially along the branches of the fifth pair of nerves; while petechial, erythematous and urticarial eruptions are not uncommon. The bowels are generally constipated; towards the close of the attack, diarrhea and involuntary evacuations may occur. All the symptoms develop rapidly, and reach their full intensity from the third to the sixth day. After the disease has lasted some time the patient may pass into that condition termed the *typhoid state*; a condition usually marked by stupor or remitting delirium, a dry, cracked tongue, sordes on the lips and teeth, a small, rapid pulse, and involuntary evacuations.

If the attack is to terminate fatally, the symptoms of nervous excitation yield to those of depression. The rigidity disappears; the pulse becomes rapid, small and scarcely perceptible; and the temperature rises to 105° Fahr. or 108° Fahr. The patient passes into a state of stupor; convulsive muscular movements or paralysis occur; the stupor deepens into coma, and death supervenes.

In favorable cases, the symptoms of depression are less marked and of shorter duration. Early in the disease the vomiting ceases, the back and head pains subside; and the rigidity disappears. The strength slowly returns, and the patient enters upon a gradual, somewhat protracted convalescence. A recurrence of vertigo and headache, during convalescence, is of serious import, and, when associated with vomiting and convulsions, points to the development of hydrocephalus.

ANALYSIS OF CHART.

The Nervous System.—The *chill* which ushers in the attack may be nothing more than a chilly sensation; usually it is pronounced, at times violent and oft repeated, and may last from one to two hours. In the majority of instances it appears abruptly, in the evening, during the night, or on rising in the morning.

Headache is one of the earlier and more persistent symptoms of the disease. It is generally severe in character, and gives rise to great restlessness and anxiety. It may be located in the forehead, occiput, temples, or extend over the whole head, and is of a beating, boring, stabbing character. As it usually con-

CHART X.—*Cerebro-spinal Fever.*

Nature:	Epidemic.		Non-contagious.	
Varieties:	Simple:	Abortive:	Intermittent.	Fulminant:
Initial Symptoms:	<u>Vomiting on rising.</u> Chill. Prostration.	Sleepiness.	<u>Vertigo.</u> Prostration	<u>Violent chill.</u> Vomiting. Prostration.
Duration:	1 to 2 weeks.	5 to 7 days.	Several weeks.	12 hours to 3 days.
Head:	<u>Headache on the first day.</u>	Headache.		Intense headache
Nervous System	<u>Restlessness.</u> Delirium.	Sleeplessness.		<u>Delirium.</u> Coma. <u>Convulsions</u> Collapse
Spine:	<u>Rigidity of post-cervical muscles.</u> Orthotonos	Stiffness in neck and spine.		<u>Contraction of neck.</u>
Extremities:	<u>Rigidity.</u> Neuralgic pains. Paralysis	Stiffness and Contractions.		<u>Muscular rigidity</u> Paralysis.
Tongue:	<u>Coated white,</u> moist; later, dry and brown.	Coated white. Moist.	Marked symptoms	Dry and brown Sordes.
Stomach:	<u>Thirst.</u> Anorexia. Billous vomiting	Vomiting.		Nausea and vomiting.
Bowels:	Neuralgic pains Constipated.	Constipated.		<u>Neuralgic pains.</u> Involuntary evacuations
Skin:	<u>Hyperæsthesia.</u> Herpes. Petechiæ	Hyperæsthesia.	Remission	<u>Hyperæsthesia</u> Purpuric blotches. Superficial gangrene.
Face:	Usually pale.	Pale.	Reproduction of the simple form	Shrunken, livid.
Eyes:	<u>Photophobia.</u> Conjunctiva injected Strabismus	Conjunctiva reddened.		Deep-sunken eyes Purulent choroiditis.
Ears:	<u>Humming and ringing.</u> Bi-lateral deafness.	Humming in ears		Deafness.
Temperature:	99.5° to 104° Fahr Atypical.	Seldom above normal.		105° to 107° Fahr.
Pulse:	<u>Extremely variable.</u> 40 to 150.	Variable.		Variable. Weak and rapid.
Respiration:	Accelerated. Irregular.	Easy.		Slow and labored Arythmic.
Urine:	Increased.	Increased.		Scanty. Albuminuria.
Convalescence:	Irregular and uncertain.	Early.		Seldom attained
Complications:	<u>Croupous pneumonia.</u> Endo and peri-carditis. Pleuritis. Parotitis. Intestinal catarrh.			
Sequels:	Debility. Weakness of memory. Local paralysis. Deafness. Hydrocephalus.			
Prognosis:	The mortality varies from 20 to 75 per cent.			
Lesion:	Fibrinous or purulent exudation in meshes of cerebro-spinal pia mater.			

tinues throughout the attack, its cessation, unless followed by coma or collapse, is a most favorable indication. In a large percentage of cases, mental or bodily fatigue will bring on severe headaches long after convalescence has been fully established.

Vertigo occurs as one of the prodromal symptoms, and is frequently associated with the headache. Recurring during convalescence, vertigo and headache, especially when associated with vomiting and convulsions, are of unfavorable omen, as indicating the development of hydrocephalus.

The pupils may be contracted at the outset and dilated at the close of an attack; not unfrequently they differ in size. There is almost constant photophobia; occasionally, nystagmus and transitory strabismus are observed. Conjunctivitis is of frequent occurrence. When it is severe there is marked chemosis, with opacity and ulceration of the cornea. At times, in consequence of severe suppurative irido-choroiditis or optic neuritis, there is permanent and complete loss of sight.

The ear symptoms, which are usually bi-lateral, consist of pain, humming and ringing in the ears, followed by partial or complete, temporary or permanent deafness. They are due either to a catarrhal or purulent inflammation of the middle ear, or to suppurative inflammation of the labyrinth.

Delirium, often transient, at times alternating with periods of stupor, is present in almost all severe cases after the second or third day. In mild cases it is slight, and occurs mostly at night; in fatal cases it becomes continuous, and finally passes into the coma which precedes death. In the worst forms, *coma* may occur without the intervention of delirium.

Convulsions are not infrequently met with in children, replacing the initial chill. They vary in degree from simple muscular twitchings, to violent epileptiform seizures. If long continued, they render the prognosis unfavorable.

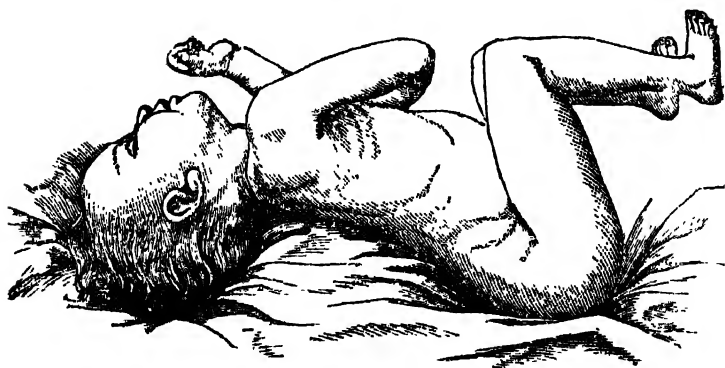
Paralysis, located in the muscles of deglutition and articulation, or affecting one or both extremities, occurs in a small proportion of cases. It usually develops towards the close of the disease, and may either disappear in a few days or last for years.

Stiffness of the neck, caused by contraction of the deep cervical muscles, is a marked characteristic. It appears mostly between the second and fifth days, and lingers far into convalescence. It varies greatly in degree, from a slight stiffness noticeable only

when attempting to flex the head, to a contraction so great that the vertex is drawn down between the shoulders, at almost a right angle with the spine. In the worst cases swallowing is rendered extremely difficult and painful. In exceptional cases this stiffness of the neck may be absent. It is generally regarded as a reflex contraction due to inflammation of the pia mater of the medulla, and of the posterior columns and roots of the cervical portion of the cord.

Contraction of the other erector muscles of the spine is present in a large proportion of cases, and varies in degree from a mere stiffness, and straightening of the spine (orthotonos), to a drawing of the trunk into so distinct an arch that the body rests only upon the occiput and heels (opisthotonos). Orthotonos is of frequent occurrence, while complete tetanoid opisthotonos and pleurosthotonos (unilateral contraction of the spinal muscles) are extremely rare. The duration of the contraction is very variable. In favorable cases it disappears in from a few days to two or three weeks; not unfrequently it continues from four to six weeks. Trismus has been observed only in patients who are dangerously ill and comatose, and is an unfavorable symptom. *Stiffness and contraction of the muscles of the extremities* is not uncommonly present.

FIG. 14.



Attitude of the Patient in Severe Cerebro-spinal Fever (After Smith).

In consequence of these muscular rigidities the usual attitude of the patient in bed (Fig. 14), is with the head drawn back, the spine straightened or arched forward, the forearms flexed upon the arms, the legs upon the thighs, and the thighs drawn up upon the abdomen.

Pains in the spine (rachialgia), neck, loins and legs, occurring in exacerbations and remissions, are frequent symptoms. They vary considerably in intensity and duration, and are often intensified by attempted movements. Inflammation of the wrist-joints is occasionally met with.

The Cutaneous Surface.—*Hyperæsthesia of the skin* though not a constant symptom, is thoroughly characteristic when present. It usually appears as early as the second or third day, and is most marked on the anterior surface of the lower extremities. It is often so severe, that the simple movement of the limbs, the mere touching of the surface of the body, or even the slightest shaking of the bed, will give rise to expressions of pain and suffering.

Cutaneous eruptions developing symmetrically are oftener associated with cerebro-spinal fever, in this country than in Europe. Of these *herpes*, commencing usually about the second or third day, upon the lips and extending over the face, and at times appearing upon the trunk and extremities, is the most common.

Petechiæ and ecchymoses are not infrequent manifestations. When present, they produce a more or less distinct, widely diffused mottling of the whole surface. Other forms of eruption occasionally observed are, roseola, erythema, urticaria, erysipelas and sudamina. Sometimes a patient presents three or four separate forms of cutaneous eruptions.

The Temperature.—The course of the fever is irregular and the temperature curve is atypical. It is apt to have attained considerable elevation as early as the second or third day. After the disease has become fully established its average range in adults is from 100.5° Fahr. to 104° Fahr.; in children it is somewhat higher. Exacerbations of pain may cause a rise of two or three degrees. In rapidly fatal cases it may reach 107° Fahr. or even 110° Fahr., as death approaches. Defervescence, rarely rapid, usually takes place by a gradual fall (lysis); a rapid fall almost invariably ushers in collapse and death. The difference between the morning and evening temperatures is neither as marked nor as constant as in most other fevers.

Wunderlich distinguishes three special fever courses:—

1. "In some very severe and rapidly fatal cases the temperature, though not invariably very high at the beginning of the

disease, reaches very striking heights in the briefest time. It remains high, rising even higher at the approach of death, till in the very moment of death it may attain 107.6° Fahr. or more. In one of his cases it reached 110.7° Fahr. It may rise some tenths of a degree after death. In some fatal cases the temperature may remain very moderate for some time, and rise rapidly and with abruptness at the close of life.

2. "On the other hand, relatively mild cases exhibit a fever of only short duration, although there are sometimes considerable elevations of temperature and often an interrupted course. Recovery does not take place by crisis, but happens rather with a remittent defervescence (lysis). Here and there cases occur which, after defervescing and apparently almost recovering, relapse all at once with a rapid rise of temperature and run a course like those marked (1).

3. "In contrast with these brief courses of fever with either very severe or slight character, we find cases which are more or less protracted. The height of the temperature in these may be varied, and indeed exhibit manifold changes in the very same case, though this chiefly depends upon the varied complications which supervene in the shape of bronchial, pulmonary and intestinal affections, and affections of serous membranes."

The Circulatory and Respiratory Systems.—*The pulse* is extremely variable, and bears no constant relation to either the height of the fever, or the gravity of the other symptoms. As a rule, especially in children, it rises with the onset of the fever, and in fatal cases is often so rapid that it cannot be counted; occasionally it remains normal; and but rarely it is retarded. Its most constant character is its *variations in rapidity*. It may show a difference of thirty or forty beats in a few hours; and sometimes even within a few minutes it may vary twenty or thirty beats. Continued rapidity is to be regarded as unfavorable.

The respirations sometimes remain undisturbed in mild cases. They are usually sighing, labored and interrupted in grave cases. The Cheyne-Stokes respiration is supposed to be due to pressure upon, or cedema of the medulla oblongata. Catarrhal affections of the upper air passages are not uncommon.

The Digestive Tract.—*The tongue* is moist and coated with

a whitish fur at the beginning of the fever and during defervescence. At the height of the disease it may become dry and brown. The teeth and lips are frequently covered with sordes. *Vomiting* is an early and frequently recurring symptom. It may occur without previous nausea, and is excited by movement, particularly by rising. Thirst and anorexia are strongly marked. Constipation is the rule. Jaundice is present in a small number of cases. Parotitis is considered a possible, but infrequent accident of the disease.

- The *urine* is increased in quantity and loaded with urates; occasionally it contains a moderate amount of albumen. Polyuria is frequently observed, especially in children.

Complications and Sequels.—The complications of cerebro-spinal fever vary in different epidemics, and at different stages of the same epidemic. The most frequent are: catarrhal and croupous pneumonia, bronchial catarrh, pleuritis, endo-carditis, peri-carditis, intestinal catarrh, choroiditis with consecutive detachment of the retina, and purulent inflammation of the labyrinth and tympanum. The more important sequels are: deafness, derangements of vision, general debility, boils and carbuncles, paralysis, weakness of memory, and chronic hydrocephalus.

Morbid Anatomy.—The lesions of cerebro-spinal fever, which are due in part to the direct action of the morbid agent upon the blood, and in part to the inflammation, are quite constant and vary only in the degree of their development. The *blood* contains more fibrin than normal, the amount varying according to the extent of the inflammation. In malignant cases it is usually dark and fluid, and contains a few dark and soft clots. Bubbles of gas have been observed occasionally in the large vessels and in the cavities of the heart, a few hours after death. The *heart* is often flabby, and exhibits changes due to granular degeneration. The pericardium is sometimes inflamed, and covered with a purulent exudation; recent endocarditis is rarely observed. The *lungs*, in a certain proportion of cases, exhibit changes, such as hyperæmia, cedema, patches of atelectasis as a result of capillary bronchitis, and infiltrations of catarrhal and less frequently of croupous pneumonia. Serous transudations, sometimes blood-stained, occasionally occur in the pleural and other serous cavities.

The *brain* and the *meninges* are intensely congested in cases which are speedily fatal. The cranial sinuses are engorged with dark fluid blood, containing soft post-mortem clots, or firm thrombi. The arachnoid membrane may remain unchanged in rapidly progressing cases; it may appear hyperæmic and blood-stained, or dry, lustreless and opaque; occasionally, as after prolonged illness, it becomes rough and thickened. The *pia mater** which is the seat of the primary inflammation, is for the first few hours hyperæmic and adherent to the surface of the brain. After the second or third day, a yellowish or greenish, butter-like exudation, consisting mainly of fibrin, mucine, pus-cells and free granules, and varying from one to four lines in thickness, is found to occupy the sub-arachnoid space. The exudation is most abundant in the fissures and depressions along the course of the vessels, upon and around the optic commissure, and also upon the pons and medulla oblongata. In cases of great severity the exudation of fibrin and pus may occur over nearly every part of the cerebral surface. The amount of serous exudation varies greatly in different cases; it may be so small as to scarcely attract attention; or it may be so large, in children, as to cause the head to present all the appearances of ordinary congenital hydrocephalus. The *brain substance* is frequently congested, and localized cerebral softening is not uncommon. The ventricles, especially in protracted cases, are found to contain more or less turbid serum, and at times pus. The *membranes of the cord* present changes similar to those of the meninges of the brain. The *pia mater* is roughened and thickened, and is intimately adherent to the cord. The exudation appears first as cloudy serum, then as bands of fibrino-pus, and lastly as thick layers of pus. It is seated mostly on the posterior surface of the cord, and is most abundant in the lumbar region. The substance of the cord may present changes similar to those observed in the encephalon, such as hyperæmia, serous infiltration, and softening.

The *muscles*, especially those extending along the spinal column, are found to have undergone granular degeneration. The *kidneys* are, as a rule, congested; at times the tubules are

*The changes in the *pia mater* may possibly be due to certain *schizomycetes*, which finding in it their necessary nourishment, cause by their development and growth such chemical changes that the walls of the capillaries of the *pia* become altered in structure.

blocked with fat granules and fibrinous casts. *Emaciation* is strongly marked, especially in protracted cases. *Post-mortem rigidity* is usually marked and of long duration. The skin displays herpetic crusts and petechial stains; more or less extensive and deep discolorations of the dependent parts of the body rapidly appear.

Differential Diagnosis.—The diagnosis of cerebro-spinal fever is usually attended with but little difficulty during the prevalence of epidemics. It is, however, far from easy when sporadic cases occur, either within the limits, or at the beginning of an epidemic, or when very young infants are attacked, or when it develops as an intercurrent affection in the course of other acute diseases such as croupous pneumonia and typhoid fever. Of diagnostic importance are, early in the disease, the sudden onset of the symptoms, the headache, the vomiting, the pains in the *neck*, spine and *calves of the legs*, the stiffness of the cervical and spinal muscles, the retraction of the head, and the general cutaneous hyperæsthesia; and later, the herpes, the restlessness and delirium, the tetanic spasms, the irregular temperature and the variable pulse.

It may be simulated by tuberculous basilar meningitis, typhus fever, typhoid fever, scarlet fever, pernicious fever, masked small-pox and tetanus.

Tuberculous basilar meningitis is distinguished by its gradual approach, and slow course, and by its generally appearing in patients of a scrofulous or tuberculous diathesis. It presents no characteristic cutaneous eruption; but when the finger is drawn across the skin of the forehead it leaves a vivid red mark. The delirium is usually transitory, and there may be slight temporary paralysis as shown in imperfect co-ordination of muscular movements, but no tetanic spasms. The paralysis may affect the optic commissure and oculo-motor tracts. Ophthalmoscopic examination will reveal, more especially when general tubercular disease exists, tubercles of the choroid with neuro-retinitis. When tubercular meningitis attacks the convexity there is a constant convulsive condition, moderate force, and very variable pulse.

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Typhus fever and *typhoid fever* present well-marked points of contrast with *cerebro-spinal fever*, which, for the purposes of differentiation, may be arranged in tabular form as follows:—

TYPHUS FEVER.	CEREBRO-SPINAL FEVER	TYPHOID FEVER.
An epidemic disease.	A pandemic disease.	An endemic disease.
Highly contagious.	Non-contagious.	Non-contagious.
Onset sudden.	Onset sudden	Onset insidious.
Occurs at all ages.	More in young persons.	More in early adult life.
Occurs at all seasons.	Occurs generally in winter.	Occurs mostly in autumn.
Duration, about 14 days.	Duration, indefinite; usually from 4 to 7 days	Duration from 3 to 4 weeks.
Defervescence, critical or by rapid lysis.	Remittent defervescence.	Defervescence by prolonged lysis.
Relapses, rare.	Relapses, common.	Relapses, occasionally.
Countenance, dusky-red.	Countenance, usually pale or cyanotic	Countenance, pale or purplish-red.
Pupils equal and contracted	Pupils unequal.	Pupils equal, often dilated.
Strabismus rare.	Strabismus common	Strabismus absent.
Deafness seldom permanent	Deafness often permanent.	Deafness occasionally persistent.
Skin emits an ammoniacal odor.	Skin has no peculiar odor.	Skin has a musty odor.
	Cutaneous hyperæsthesia.	
<i>Mulberry rash</i> , rarely absent.	Eruptions various; mostly <i>herpetiform</i> and <i>petechial</i> .	<i>Rose-rash</i> , seldom absent.
Appears on 5th or 6th day	Appears on 1st or 2d day	Appears on 7th to 9th day.
Echymoses, rare.	Echymoses, common.	Echymoses, rare.
Headache, dull or heavy.	Headache, acute and agonizing	Headache, dull
Delirium rarely absent.	Delirium often absent. Begins on first or second day.	Cerebral symptoms approach gradually.
Temperature range, typical.	Temperature fluctuating and atypical.	Temperature range, typical.
Pulse, soft; 100 to 140.	Pulse variable, frequently slow.	Pulse, 100 to 140.
Vomiting, rare.	Bilious vomiting a constant symptom.	Vomiting, occasional.
Tetanic spasms absent.	Tetanic spasms frequent.	Tetanic spasms rare.
Pains, dull and muscular.	Pains sharp, lancinating and neuralgic in character, in spine and extremities.	Pains, dull and muscular.
Emaciation slight.	Emaciation marked.	Emaciation great.
Blood never fibrinous.	Blood highly fibrinous.	Blood rarely fibrinous.
No constant lesions.	Constant lesions of the cerebro-spinal pia mater.	Constant lesions of ileum and mesenteric glands.
Mortality, 15 to 50 per cent.	Mortality 20 to 75 per cent.	Mortality 15 to 20 per cent.

Scarlet fever may, in the early hours of invasion, present many of the initial symptoms of cerebro-spinal fever. The early redness of the middle of the soft palate, and the rapid appearance of the scarlatinal rash, will usually enable the diagnosis to be made with certainty.

Pernicious fever may be confounded with the fulminant variety, or with either of the other varieties as they approach convalescence. The main points of difference may be summarized as follows:—

CEREBRO-SPINAL FEVER.

PERNICIOUS FEVER.

A pandemic disease.	An endemic disease.
Chiefly among children.	Common to all ages.
Occurs mostly in winter.	Occurs mostly in spring and fall.
Inceptive chill appears suddenly; usually without prodromes.	Initial chill, usually preceded by an intermittent fever paroxysm.
Face pale or cyanotic.	Complexion sallow.
Eruption on first or second day.	No eruption.
The fever rise shows marked irregularity.	The fever rise shows marked periodicity.
Constipation the rule.	At times diarrhoea.
Muscular contractions the rule.	Muscular contractions rare.
Blood highly fibrinous; absence of pigment.	Blood lacks fibrin, but contains free pigment.
Spleen slightly enlarged.	Spleen enlarged and softened.

Masked small-pox, which at times resembles this disease, may be recognized by the absence of tetanic spasms of the post-cervical muscles. True *tetanus* is distinguished by the absence of epidemic influence, by the history of the case, by the absence of fever, and by the clearness of the mental faculties.

Prognosis.—The prognosis can never be made with certainty, as the course of the disease is extremely variable. The abortive and fulminant varieties run a rapid course, and terminate in from one to five days. The simple and intermittent varieties may run their course in from one to two weeks or they may last for months. As a rule, the first week is the period of greatest danger. The usual termination in fulminant cases is death. A steady amelioration of all symptoms within the first or second week, in mild or moderately severe cases, renders a favorable prognosis possible. Unfavorable symptoms are: intense excitement, early appearance of symptoms of depression, return of the vomiting, intense headache, deep and persistent coma, ex-

tensive petechiæ, recurring convulsions, and irregular respiration. Relapses are not infrequent, and often prove fatal.

The ratio of mortality varies greatly in different epidemics, but averages about forty per cent. In the majority of cases, death takes place by failure of the respiratory nerve-centers.

LECTURE XVI.

Cerebro-spinal Fever.—(CONTINUED.)

TREATMENT.

Prophylaxis.—Statistics show that cerebro-spinal fever appears most frequently, assumes, as a rule, its worst form, and numbers its largest percentage of victims where sanitary requirements are most neglected. Attention should, therefore, be given to proper sewerage and drainage, and to the prompt removal of all refuse and decaying matter from the streets and dwelling places. During an epidemic, unusual mental and bodily fatigue, and all irregularities in the mode of life, should be strictly avoided. *Argentum nit.* is recommended as a preventive for the simple variety and *arseniate of quinine* for the intermittent form.

Principal Remedies.—The remedies that oftenest claim attention at the outset of an attack, are *veratrum vir.*, *gelsemium*, *belladonna* and *solanum nigrum*.

Veratrum vir. is adapted to *severe* cases, and more especially when there is intense brain congestion with nausea and vomiting, a hard, full, bounding pulse, and marked opisthotonos. *Gelsemium* is indicated in *mild* cases, and such as are attended by a lesser degree of inflammation of the meninges. The pulse is usually quick, full and soft, the headache is heavy in character, and is located mainly in the occipital region. *Belladonna* may be employed when there is more or less active delirium, with redness of the face and eyes, and alternately contracted or dilated pupils. *Solanum nig.* takes the place of bell., when spasms and convul-

sions mark the onset of the disease. *Rhus tox.* will be needed when a typhoid state supervenes, and especially when the cutaneous eruptions are of a multiform character. In the last stages when there is a tendency to coma, *opium* should be given.

For the intermittent variety in the first stages, *cedron*, *arseniate of quinine* and the *picrate of ammonia* are important remedies. When the typhoid state is engrafted on this variety, and there is great restlessness and extreme prostration, *arsenicum alb.* will be needed.

In fulminant cases, where the chill is prolonged and there seems to be no power of reaction, *camphor* should be given.

Crotalus may at times render valuable service in these cases, particularly when the petechial phenomena are prominent. *Secale* is a noteworthy remedy for the internal congestion, the convulsive shocks and the tetanic phenomena.

Verat. alb. or *nux vom.* may be needed for the electric-shock-like pains in the abdomen and extremities. *Cicuta* for tonic spasms of all the muscles of the body, with gastralgia and violent vomiting. *Cimicifuga* when spasms and obstinate vomiting continue after the acute symptoms subside. *Digitalis* when the heart's action is irregular and labored, and the urine is diminished in quantity. *Physostigma* when there is contraction of the pupils, with a tumultuous, irregular and feeble heart, tetanic rigidity, and retraction of the head.

Baptisia may be administered as an intercurrent remedy in the typhoid state, when general paralysis threatens, the excretions become offensive, and the blood rapidly tends to disorganize. *Helleborus* is called for when there are indications of serous effusion, and when the phenomena of paralysis have become complete. *Ignatia* and *cannabis ind.* deserve attention when there are hysterical symptoms or complications. *Phosphorus* must be employed when pneumonic complications exist, and when there are extensive petechiæ.

During convalescence, *zincum* or *anacardium* for weakness of memory; *plumbum* or *cuprum* for paralysis; and *silicea* or *sulphur* for deafness, may be needed.

Leading Indications.—*Aconite*.—During or after the chill. Dryness of the skin, with restlessness and great thirst. A quick, hard, sharp pulse (*bell.*). Tearing in the nape of the neck;

stiffness of the back (*rhus*). Despairing mood and fear of death (*ars*). In plethoric individuals.

Æthusa cyn.—Vertigo with a tendency to stupor and coma; obstinate vomiting. Tearing, lancinating, beating pains in the occiput, extending all over the head. Face pale and collapsed; eyes staring; pupils dilated and insensible to light (*hyos*). Epileptiform convulsions. During dentition.

Agaricus musc.—Vertigo; great weight in the occiput; the head constantly falls backward. Great weight in the forehead and temples with delirium and coma. Twitching of the eyelids and eyeballs. Twitchings of the facial muscles; painful sensitiveness of the scalp. Stiffness and sensitiveness of the nape of the neck and spine. Violent, burning, shooting pains deep in the spine. Paralysis of the upper and lower limbs.

Ammonium carb.—Oppressive fullness in the forehead and vertex, as if the head would burst. Ringing in the ears; swelling of the parotids (*merc*). Painful stiffness of the neck and small of the back. Weak, nervous individuals and scrofulous children.

Anacardium.—Loss of memory; weakness of all the senses (*phos. acid, zincum*). Dull pressure as with a plug on the left side of the vertex. Cramps in the calves when walking; knees feel paralyzed. Hypochondriasis (*lyc*).

Apis mel.—Headache with vertigo; brain feels tired; burning and throbbing in the head, relieved by pressure. Sopor interrupted by piercing shrieks (*hell., hyos*). Stiffness in the back of the neck; inability to hold up the head. Oedematous swelling of the face (*ars*). Sunk, half-closed eyes. Stinging, shooting pains all over; hyperæsthesia of the surface; soreness of the abdominal walls. Grating of the teeth. Scanty urination (*aco*). Hurried, difficult respiration. Variable and intermittent pulse. Convulsions.

Apocynum cann.—Hydrocephalus; open sutures; projecting forehead. Constant, involuntary movement of one arm and leg. Sight of one eye totally lost. Great irritability of the stomach with distressing vomiting. Suppression of urine (*hyos*).

Argentum nit.—Violent headache with vertigo. Digging, cutting pains from the occiput to the frontal protuberance.

Painful fullness and heaviness in the head. Intolerance of light; clouds before the eyes; double vision (*bell.*). Soporose sleep, with constant murmuring. Pale, bluish, sunken face. Tender, easily bleeding gums (*nit. acid.*). Irresistible desire for sweets (*kali carb.*, opp. *nit. acid.*). Violent cardialgia with griping and burning. Stools and urine pass unconsciously. Irregular, intermittent pulse. Tremulous weakness. Bluish-black eruption. Epileptiform convulsions.

Arnica.—Stupid, apathetic state (*phos. acid.*). Pressive headache, as if distended. Sticking pains in the temple and forehead. Great heat in the head with coldness of the body. Weakness of the cervical muscles; cervical vertebræ very sensitive to touch and pressure. Soreness in all the limbs (*rhus*) as if bruised. Great sinking of strength. Ecchymosed spots on the skin.

Arsenicum alb.—Great restlessness, fear and anguish (*aconite*). Intense headache with vertigo and humming in the ears. Sensation as if the brain beat against the skull, during motion. Excessive photophobia. Stiffness of the nape of the neck and spine. Deathly color of the face. Grinding of the teeth during sleep (*bell.*, *hell.*). Dryness of the mouth; tongue dry, brown and trembling (*lach.*). Difficult breathing, with great anguish; irregular, quick, weak pulse. Cramps in the calves. Epileptic convulsions. Petechiæ. Great weakness and prostration.

Baptisia.—Frontal headache with pressure at the root of the nose (*aconite*). Bruised and painful feeling at the base of the brain and upper part of the spinal cord, worse on stooping. Stiffness and lameness of the cervical muscles. Restless, tossing about, rolling of the head from one side to another. Constant biting of the fingers, and moving of the feet, while unconscious. Vertigo, with wandering pains in the limbs. Stiffness and lameness all over the body (*arnica*). Sensitiveness of the stomach to pressure (*bry.*); sinking gone feeling in the epigastrium (*hyd.*, *ign.*). Urticarial eruption (*apis*).

Belladonna.—Vertigo, on sitting up or turning over in bed, with nausea and vomiting (*bry.*, *puls.*). Alternate paleness and redness of the face (*aco.*). Stupor with head congestion, with dilated pupils (*hyos.*); double vision, rolling and squinting of the eyes. Great intolerance of light (opp. *stram.*). Violent

throbbing pain extending from the neck into the head (*aconite*, *glon.*). Jerking headache, with inclination to bend the head backward. Great soreness and stiffness of the neck. Shooting and gnawing pains in the spine and extremities. Drowsiness, yet inability to sleep (*lach.*). Restless sleep with frequent startings (*hyos.*, *opium*). Spasmodic distortions of the face and lips. Delirium, with grinding of the teeth and inclination to bite. Nausea with cutting, gnawing pain in the stomach. General hyperæsthesia (*coffea*). Retention of urine or involuntary micturition. Coldness of the extremities with heat of the head. During dentition; and in young, full-blooded individuals.

Bryonia.—Extremely irritable (*cham.*). Vertigo on sitting up in bed (*aco.*, *puls.*). Splitting headache, worse from motion, and on opening the eyes, especially in the morning. Tearing pain in the right side of the head (*bell.*, opp. *aco.*). Dark red face, suddenly changing color. Chewing motions during sleep. Child cries when taken up or moved. Drowsy sleep (*rhus*). Vivid, frightful dreams. Pressive pain in the occiput, drawing down into the neck, with stiffness. Pain in the back and limbs, as if bruised (*arn.*). Loss of appetite; soreness of the stomach (*bell.*). Tongue thickly coated white or else dry and brownish. Hasty, impetuous drinking and swallowing; desire for large quantities of water. Dysuria; constipation. Dry, burning heat all over, especially in the head.

Camphor.—Great anxiety and extreme restlessness (*ars.*). Vertigo with heaviness of the head, and constriction at the base of the brain. Throbbing in the cerebellum. Deadly paleness of the face. Severe chill with coldness of the face, tongue, lips and extremities. Icy coldness of the whole body. Sudden and great sinking of strength (*ars.*). Violent cramps in the stomach and limbs. Suffocative dyspnoea. Small, weak, slow pulse. Rigidity of the limbs, clenching of the teeth, and retraction of the head. Tetanic spasms; epileptiform convulsions.

Cannabis ind.—Vertigo on rising, with stunning pain in the occiput. Violent shocks through the brain. Involuntary movements of the head. Dilatation of the pupils with sensitiveness to light (*bell.*). Extreme sensitiveness to noise. Paleness of the face. Suffocative dyspnoea. Irregular, feeble pulse. Hysteri-

cal symptoms; emprostotonos with loss of consciousness. Hallucinations.

Cantharis.—Anxious restlessness; great mental activity. Amorous frenzy. Dysuria, or retention and suppression of urine. Violent burning and lacerating pain in the occiput. Stiffness of the neck, with tearing, lancinating pains extending up into the head. Oppression of the chest. Tearing in the limbs, relieved by rubbing. Over-sensitiveness of the whole body. Albuminous urine.

Cicuta vir.—Vertigo, with jerking and twitching of the head. Severe occipital headache. Tonic spasms of the cervical muscles; retraction of the head. Pupils dilated and insensible (*bell.*); double vision (*hyos.*). Deafness. Grinding of the teeth (*cina., ign.*). Jerking of the eyeballs and facial muscles; spasmodic distortion of the limbs; opisthotonos. Tonic spasms renewed from the slightest touch or noise. Convulsions with screaming. Violent hiccough. Clenching of the teeth; inability to swallow. Dyspnoea. Gastralgia with vomiting and painful distension of the abdomen. Great agitation.

Cimicifuga.—Intense pain in the head; brain feels too large (*nux*). Pain at the base of the brain and along the spine. Sensitiveness of the spine. Stiffness and retraction of the muscles of the neck and back. Intense aching pain in the eyeballs (*bry.*). Redness of the fauces and palate. Circumscribed or diffused muscular soreness (*arn.*). Great sensitiveness of the skin. Profuse, general perspiration; creeping chills down the back. Alternate tonic and clonic spasms. Obstinate sleeplessness (*coff., opium*). Delirium resembling delirium tremens (*digit.*); sees cats and dogs, fear of death (*aconite*).

Cocculus.—Vertigo with inclination to vomit on rising (*bry.*). Headache as if the eyes would be torn out. Violent pains in the forehead; convulsive trembling of the head. Pale, sallow, bloated face. Hardness of hearing; noise in the ears like the rushing of waters (*theridion*). Swelling and induration of the sub-maxillary glands (*merc.*). Violent cramp of the stomach (*coloc.*). Spasmodic oppression of the chest; heavy, laborious respiration. Weakness of cervical muscles, with inability to support the head. Painful stiffness of the neck. Vivid, fearful dreams; fainting fits, hysterical and epileptiform convulsions.

Miliary cutaneous eruptions. Trembling of all the limbs (*ign.*). Paralysis.

Crotalus.—Intense headache; pain as from a blow on the occiput. Delirium with open eyes. Extreme pallor of the face; anxiety and dyspnoea. Pain in the epigastrium; unquenchable thirst; faintness and vomiting. Pain in the extremities. Ecchymoses; convulsions; paralysis.

Cuprum.—Anguish with great restlessness and tossing about (*ars.*). Afraid of falling; clings tightly to the nurse. Bruised feeling deep in the brain, and in the orbits on turning the eyes (*gels., hell.*). Convulsive motions of the eyes (*gels.*). Stupor, with twitching and jerking of the limbs. Coldness of the hands; bluish appearance of the fingers. Deep, sunken eyes, with blue rings around them. Spasmodic distortions of the face; the tongue is alternately protruded and withdrawn, with great rapidity. Violent intermittent contractive pains in the stomach; tenderness of the abdomen. Painful contraction of the chest, especially after drinking; dyspnoea. Clonic spasms; epileptiform convulsions. Herpetic eruption. In children during dentition.

Digitalis.—Great pressure and weight in the head; severe lancinating pains in the vertex and occiput. Stupor with dilatation of the pupils. Stiffness of the cervical muscles. Tearing, cutting pains in the nape of the neck. Inability to support the head from weakness of the cervical muscles. Sleep with sudden, cracking noises in the head, frequent startings and dreams of falling. Deathly nausea; convulsive efforts at vomiting (*tart. emet.*). Vomiting with coldness; prostration; faintness; sensitiveness in the epigastrium. Extremely slow pulse (*cann. ind.*), at times intermittent and irregular. Feeble, irregular, and labored action of the heart. Irregular, difficult and sighing respiration.

Gelsemium.—Brain feels as if bruised (*cupr., hell.*). Dullness of the mental faculties (*bapt.*); feels as if intoxicated. Great exhaustion and drowsiness. Heat of the head with icy cold hands and feet. Feeling as of a band around the head, above the ears (*merc.*). Convulsive movements during sleep. Itching of the head, face and neck. Paralysis of the eyelids. Double vision; dilated pupils. Nausea and vomiting, with weak,

scarcely perceptible pulse. Feeble, labored respiration. Trembling and complete loss of muscular power. Inability to direct the movements of the limbs. Neuralgic and rheumatic pains in the extremities (*bry.*, *cim.*, *rhus*). Yellowish-white coating on the tongue; dysphagia. Sweating relieves (*opp. merc.*). In children and nervous people.

Glonoine.—Congestion of the head with a sense of expansion. Fullness and pulsation in the head (*bell.*). Undulating, wave-like motion in the brain (*hyos.*). Pain along the whole length of the spine. Pains ascend from the chest and neck to the occiput. Optical illusions; eyes injected and rolled upwards; pupils dilated (*bell.*). Blindness with faintness and nausea. Bluish pallor under the eyes. Deafness with ringing in the ears. Alternating redness and paleness of the face. Nausea and vomiting with headache. Pulse mostly accelerated; often rises and falls, alternately. Sudden spasms.

Helleborus.—Vertigo. Stupefaction with sensation of soreness in the back part of the head, as if bruised. Boring of head in pillow (*apis*). Face, pale and cedematous. Frequent rubbing of the nose (*cina*). Constant chewing motions (*bry.*); grating of the teeth (*hyos.*). Drinks cold water hurriedly; rolls the tongue from side to side. Automatic motion of the arm and leg on one side. Convulsive movements of the muscles (*cupr.*). Soporose sleep with screaming and starting. Nausea with vomiting of green mucus (*ipccac*). Urine scanty and dark, with a sediment like coffee-grounds. Rapid, small, tremulous pulse. Hydrocephalus. In scrofulous children; during dentition.

Hyoseyamus.—Pressive, stupefying headache. Undulating sensation in the brain (*glon.*). Violent pains in the head alternating with pains in the nape of the neck. Pressure in the vertex and drawing in the nape of the neck, when turning the head. Sensation as if the brain were shaken and loose (*bell.*). Startings from fright (*gels.*); grinding of teeth (*hell.*). Dimness of vision, paralysis of the tongue; constriction of the throat. Inability to swallow fluids (*bell.*, *stram.*). Involuntary stools and urine, or else retention. Stiffness of the cervical muscles. Convulsive jerks of muscles (*bell.*). Stiffness of the arms and legs; jerking of the hands and feet. Rigidity. Spasms of the chest, with arrest of breathing. Small, quick, intermit-

tent pulse. Cutaneous hyperæsthesia. Epileptiform convulsions.

Ignatia.—Changeable disposition; alternate gaiety and tears (*hyos.*). Pressing headache, as from a nail, from within to without. Jerking headache, aggravated by raising the eyes. Convulsive movements of the eyes and lids. Twitching of the muscles of the face. Spasmodic constriction of the chest; frequent sighing. Throbbing in the abdomen (*aloës*). Stiffness of the nape of the neck (*kali carb., lach.*). Convulsive jerking of the arms and legs (*stram.*). Over-sensitiveness to pain (*coffea*); hysteria. Violent pain in small spots, only discovered on touching them. Convulsions. During dentition; or after fright or grief.

Lachesis.—Pressive headache, over the eyes and in the occiput. Pains extend from the head to the neck and shoulders; heaviness in the occiput with vertigo. Stiffness of the nape of the neck (*rhus*). Pricking, pulsating, tearing pains. Cramp-like pain in the præcordial region, with irregular action of the heart. Oppression of the chest. Difficult speech; tongue trembles when protruded, or catches behind the teeth. Solids swallow better than liquids. Cannot bear the clothing tight around the waist (*opp. nit. acid*). Miliary eruption.

Laurocerasus.—Stupefying pain in the head; brain feels as if loose. Twitching and convulsions of the facial muscles (*cicuta*). Difficult deglutition (*stram.*). Lock-jaw (*hyos.*). Spasmodic oppression of the chest. Irregular beating of the heart, with slow pulse (*dig.*). Stiffness in the nape of the neck and small of the back. Stinging, tearing in the extremities. Rapid sinking of the vital forces (*camphor, verat.*).

Lycopodium.—Dread of being alone. Stupefying headache, extending down the neck, worse from 4 to 8 p. m. Pressive headache in the vertex (*nux*). Stiffness of the neck; tensive pain in the neck and occiput. Drowsiness, with loud screams during sleep; ill-humor after sleep. Over-sensitiveness of hearing with roaring in the ears (*can. ind.*). Over-sensitive smell; fan-like motion of the nostrils. Pendulum-like motion of the tongue, which is swollen. Sinking of the lower jaw (*opium, nux, mur. acid*). Yellowish-gray color of the face (*ars.*); blue rings around the eyes. Tension in the abdomen and chest as from a hoop (*cact.*). Burning pains between the shoulders (*phos.*).

Drawing, tearing in the limbs at night (*merc.*). Numbness and twitching through the body and limbs. Pneumonic complications (*phos.*),

Nux vom.—Drawing, tearing, jerking pains in the head, from the orbit to the occiput. Shocks, starting suddenly from one portion of the brain, with numbness and drawing in the limbs. Sensation as from a bruise in the back of the head. Over-sensitiveness to external impressions. Heaviness and stiffness in the neck. Tearing pain in the nape of the neck and back (*puls.*). Stitches through the body in jerks. Paleness of the face; twitching of the facial muscles. Straining to vomit, first water, then food (opp. *ipecac*). Opisthotonos with unconsciousness. Convulsions renewed by the slightest touch (*stram.*).

Opium.—Stupefaction with half-open eyes; deep, slow, snoring respiration. Stupid sleeplessness with frightful dreams. The occiput feels as heavy as lead; the head falls back, constantly. The eyes are fixed and half-closed (*bell.*); pupils contracted (*hyos., physostigma*) or dilated, insensible to light. Dark-red, bloated face; relaxation of the muscles, with twitching of the lips and flapping of the cheeks. Lock-jaw. Opisthotonos (*nux*). Abdomen hard, distended, and sensitive to the touch. Pulse variable; very quick or very slow. Dyspnoea. Spasmodic jerkings, and numbness of the limbs. Heat with sweat; sleep with sweat; worse while perspiring (*merc.*, opp. *gels.*); bed feels so hot, cannot lie on it. Convulsions, with loud screams on entering the fit.

Oxalic acid.—Pressing in small spots in the head. Pale, sunken face. Dryness in the throat with difficult deglutition. Stomach very sensitive to pressure. Oppression of the chest. Pain in the back, between the shoulders, extending to the loins. Coldness and numbness of the hands; stiffness and paralysis of the lower extremities. Pains appear periodically. Thinking of the symptoms aggravates them (opp. *camphor*).

Phosphorus.—Stupefying headache, with acuteness of smell (*bell., lyc.*). Burning and stinging pains and pulsations commencing in the occiput. Stiffness in the nape of the neck, sensitiveness of the spine; back pains as if broken. Difficulty of hearing, especially of the human voice; contracted pupils (*opi-*

um, physos.). Face bloated or cadaverous-looking. Formication and tearing in the limbs. Soreness of the abdomen and stomach to touch. Spasmodic contractions of the chest (*moschus*). Dyspnoea with inability for exertion. Pneumonic complications (*lyc.*). Extensive petechiæ or hemorrhages. After over-doses of camphor.

Physostigma.—Contraction of the pupils (*opp. bell.*). Obstinate constipation, with flatulent distension of abdomen. Pain in the stomach immediately after eating. Tetanic spasms with irregular, tumultuous action of the heart. Epileptiform convulsions.

Plumbum.—Heaviness in the head, especially in the cerebellum. Sudden deafness. Twitching and jerking in the limbs. Sharp, neuralgic pains in the lower limbs occurring in paroxysms; hyperæsthesia. Paralytic weakness in the limbs; wasting of the muscles of paralyzed parts.

Rhus tox.—Stupefaction; vertigo when rising from the bed (*bry., gels.*). Anxiety with great restlessness (*ars.*). Disturbed sleep with vivid, frightful dreams. Fullness and bruised pain in the head extending to the ears; aching in the occiput. Hemorrhage from the ears and nose. Swelling and hardness of the salivary glands. Dryness of the mouth with much thirst (*nit. acid.*). Thirst for cold water or cold milk. Red, dry and cracked tongue (*bapt., bell.*). Various eruptions; red rash all over the body; eczema on the face (*lyc., merc.*). Short, dry cough from tickling in the bronchi (*rumex*). Sensation of weakness and trembling in the heart (*bell., spig.*). Pains in the shoulders and back as if strained. Tearing tensive pains, with stiffness of muscles and joints.

Solanum.—Terrific headache, as if the head would split. Raving delirium; convulsions with moaning and coma. Violent subsultus tendinum; tetanic rigidity of the whole body. Contraction of the pupils; slowness of the pulse. Neck feels stiff and sore, as if bruised (*arn.*). Weakness and bruised feeling in the back and limbs (*rhus, rhod.*). Stiffness and convulsions excited by the least touch.

Spongia.—Heat in the head with redness of the face (*bell.*). Pressing, knocking, pulsating pain in the forehead. Dull head-

ache in the right side of the brain, better when lying in the horizontal position. Stupid slumber; frequent waking with a start. Painful stiffness of the muscles of the neck and throat. Throwing the head backwards with tension in the neck. Double vision; staring eyes. Dyspnoea and great weakness in the chest. Full, hard, frequent pulse.

Stramonium.—Convulsive movements of the head, mostly to the right side; head bent forward instead of back. Head and face hot; limbs cold. Furious delirium (*bell.*). Indifference to persons or things (*phos. acid.*); calls for persons who are present, but does not know them. Stammering or speechlessness. Screaming as if frightened on waking (*bell.*). Conjunctivæ injected; pupils dilated (*bell., hyos.*); transient, total blindness. Bright light and glistening objects cause convulsions. Great dryness of the mouth and fauces. Dysphagia (*bell., hyos.*). Trembling and convulsive movements of the limbs. Suppression of all secretions and excretions. Intense scarlet rash over the whole body (*bell., rhus.*). Suppressed miliary eruptions.

Sulphur.—Heaviness, fullness and pressure in the forehead. Pain as if the brain were beating against the skull (*nux, spig.*). Scalp painfully sensitive to the touch (*cinch.*). Sweat on the head of a musk-like odor. Pale, distorted features. Ulceration of the margins of the lids (*merc.*). Pustules and ulcers on and around the cornea (*lach., sil.*). Sour smell from the mouth, especially in the morning. Hardness of hearing (*caust.*); ringing and roaring in the ears (*cinch.*). Drawing, tension and stitches in the nape of the neck. Drawing, tearing pains in the limbs. Cramps in the calves of the legs and soles of the feet, especially at night (*silicea*). Turbid urine (*lach.*) with red sediment.

Tarantula.—Intense headache, deep in the brain, aggravated by touch, with restlessness and anguish. Sensation as of cold water being poured (dropped, *cann. sat.*) on the head. Pain in the occiput as if striking it with a hammer. Pricking itching sensations over the whole body. Convulsive trembling of the body.

Veratrum alb.—Violent headache with delirium; or unconsciousness. Rolling of the head from side to side, with short screams; boring the head in the pillow (*apis*). Convulsive

shocks and vomiting as soon as head is raised. Spasms with convulsive motions of the limbs. Stiffness of the neck. Pale, cold, sunken, pointed face (*ars.*, *camphor*). Cold sweat on the forehead. Violent vomiting, with nausea and great exhaustion. Tongue cold (*carbo veg.*); or red and swollen (*bell.*, *rhus*). Cramps in the calves (*sulph.*). Tingling and coldness of the limbs. Icy coldness of the hands and feet. Feeble, irregular, intermittent pulse. Sudden sinking of strength (*ars.*, *camphor*).

Veratrum vir.—Severe frontal headache with vomiting. Vertigo and headache with dilated pupils and dimness of vision. Headache proceeding from the nape of the neck (*sang.*). Trembling as if frightened and on the verge of spasms. Rolling of the head and eyes. Opisthotonos. Sudden spasms with nausea, vomiting and utter prostration. Constant, severe, aching pain in the neck and shoulders. Convulsive twitchings of the muscles of the face (*cicuta*, *gels.*). Face flushed (*bell.*); or pale, and covered with a cold perspiration (*verat. alb.*). Coldness of the whole body (*verat. alb.*). Dryness of the mouth and lips. Red streaks in the middle of the tongue; yellow edges. Smallest quantity of food causes vomiting. Spasms of the œsophagus; painful, almost constant hiccough. Oppression of the chest. Galvanic-like shocks in the extremities. Paralysis. In plethoric individuals.

Zincum.—Retarded convalescence, with weakness of memory (*anac.*, *nux*). Frequent attacks of vertigo. Pressure in small spots on the head. Stiffness and pain in the cervical and upper dorsal muscles. Bruised pain in the small of the back. Alternate paleness and redness of the face (*aconite*). Earache. Dryness and constriction in the throat with accumulation of mucus. Gaggling and vomiting with ravenous hunger and obstinate constipation. Scanty, turbid urine as if mixed with clay. Dysuria. Involuntary urination while coughing or sneezing (*caust.*). Twitching and jerking through the whole body during sleep. Drawing, tearing pains in the limbs. Stiffness of the joints with transverse lancinating pains above the joints. Cannot keep the feet still. Exhaustion of nerve force. Profuse sweats.

HYGIENIC AND DIETETIC TREATMENT.

The general management of cerebro-spinal fever may be summed up in a few words. The sick room should be darkened

and well ventilated, and the strictest quietude observed. A hot mustard foot bath or a general hot-bath (100.5° Fahr. to 102° Fahr.) should be employed as early as possible. Hot water may be applied by a sponge passed over the spine every two or three hours. Or a compress wrung out of hot water may be kept constantly applied to the nape of the neck. Continuous heat is employed in preference to cold, as the tendency to early depression is frequently counteracted by it. Stimulation with brandy or whisky must be resorted to whenever symptoms of depression of the nervous system show themselves. The amount of stimulation necessary will be regulated as in other fevers by the pulse, and first sound of the heart.

The diet should consist of milk, meat-juice, broths, light soups, and light farinaceous foods. It should be given at intervals of two hours during the day, and three hours during the night, except when resting quietly. Solid food may be allowed as soon as the patient is able to digest it.

When spasms or irritability of the stomach render the administration of food and medicines by the mouth impossible, nutritious enemas should be employed, and the medicine administered hypodermatically (page 98.).

In cases attended with great prostration, as there is danger of syncope, the patient should be kept constantly in the recumbent posture.

LECTURE XVII.

Influenza.

Definition.—Influenza is a miasmatic-contagious disease, of from three to ten days' duration, due to an unknown morbid agent, and occurring only in wide-spread epidemics. It is characterized by suddenness of onset; by great and early prostration; and by the development of general catarrhal symptoms. Usually there is intense frontal headache, coryza, sore throat, a tickling cough, dyspnoea, pains in the back and limbs, fever of varying intensity, and great nervous depression. At times there is more or less severe catarrh of the gastro-enteric mucous membrane with hepatic disturbance. Inflammatory affections of the lungs are not rare complications. The disease is very rarely fatal, except in advanced life. When death takes place, it is generally the result of complications. Relapses are not uncommon.

Synonyms.—Epidemic catarrhal fever. Epidemic catarrh. La Grippe.

History.—Although influenza is a disease which is supposed to have prevailed from remote antiquity, it has been clearly recorded only since the beginning of the fourteenth century. In 1311 and 1403 a very fatal epidemic prevailed in France. In 1510 an epidemic, starting in Malta, spread in a northwesterly direction, and traversed the whole of Europe. A rapidly spreading epidemic started in Asia in 1557, and extending to Europe and America, encircled the globe. In 1580 a great epidemic taking a northwesterly course, overran Asia, Africa and Europe. During the seventeenth century several epidemics are recorded

as having occurred throughout Europe, Great Britain and America. A wide-spread epidemic swept over Europe in 1729 and 1730. Two years later a mild and slowly-spreading epidemic started in Saxony, traveled in a northwesterly direction until it reached the British Isles, and there dividing and passing in southward, westward and southeasterly directions, it traversed the American continent, the West Indies and eastern Europe. Several widely-extended epidemics prevailed in Europe, America and the West Indies between the years 1737 and 1780. A remarkable epidemic starting in Asia in 1782 traveled westward through Europe, and even attacked the crews of ships upon the high seas. Children were relatively exempt from seizure during this epidemic. Numerous recurring outbreaks occurred in Europe and America from 1788 to 1827. In 1830 the disease began in China, and by a series of wide and rapidly spreading epidemics, in a tour which occupied two years, again encircled the world. In 1837 it reappeared in Russia, and again spread over Europe. From this time on till 1850-51 numerous epidemics occurred. In the United States the epidemic of 1843 was remarkable for the greatness of its extent. Since 1850 all epidemics of influenza have run a comparatively mild course. Extensive but mild epidemics prevailed as epizootics among domestic animals throughout the United States and Canada, in 1872, 1880 and 1882.

Etiology.—The causes of influenza are of two kinds, predisposing and exciting.

1. *The Predisposing Causes.*—*Climate* has no direct influence upon the extent of the prevalence of the disease. Its course is not cyclical nor is it in any way connected with known atmospheric conditions. It appears in every latitude, and prevails alike in hot and dry, or cold and wet seasons.

Age exerts little influence as a predisposing cause. Infirm and aged persons are supposed to be most susceptible. In some epidemics children are almost exempt.

Sex in itself has no influence upon the course of the disease, although statistics show that in most epidemics females are the first to be attacked.

Occupation does not in any way predispose to influenza.

The mode of life of the individual exerts little influence.

Overcrowded or illy ventilated habitations are supposed to favor the greater prevalence of the disease.

Previous attacks afford no protection.

Epidemics do not follow the great lines of human travel, but extend over vast areas, usually in a direction from the east or northeast toward the west and south. At times they radiate in different directions from various centers. The rate of progress of the epidemic influence may be either slow or rapid. When it enters a locality, it prevails, as a rule, from one to two months.

2. *The Exciting Cause.*—The nature and origin of the morbid agent of influenza remains as yet unknown. It is generally supposed to be a living miasm having an independent existence, and capable, to a *slight extent*, of being reproduced in or about the human body, and of being transmitted by the air, or by the persons or clothing of those affected. The period of incubation varies from a few hours to several days.

Clinical History.—The course of an attack of influenza, which may be either mild or severe, will depend partly upon the character of the epidemic, partly upon the activity and quantity of the morbid agent, and partly upon the power of resistance of the patient. In *mild cases* there is a general feeling of malaise, followed by a sub-febrile state attended with nervous prostration and slight catarrhal symptoms.

In *severe cases* the onset of the attack is usually abrupt. A chill or chilliness alternating with heat marks the invasion of the disease. The fever, which soon follows, may be either moderate or of high grade, and displays a tendency to morning remissions. Intense frontal headache, with pains in the orbits, in the region of the antrum of Highmore, and the Eustachian tube, and at the root of the nose, appears early. Sneezing, swelling and redness of the eyelids and nostrils, a watery discharge from the nose, lachrymation and loss of the sense of smell, rapidly supervene. The throat becomes sore, and there is loss of taste and appetite. A dry, tickling paroxysmal cough appears, attended by more or less hoarseness, chest pain, and dyspnoea. The pulse is full and but slightly increased in frequency. There is restlessness, pain in the extremities and great nervous depression. Cutaneous hyperæsthesia occasionally occurs. At times symptoms of catarrhal disturbance of the gastro-intestinal tract

predominate. Exceptionally the disease attacks the mucous surfaces of the head, chest and abdomen.

The continuance of the fever is usually of short duration. At the end of four or five days defervescence sets in, and the temperature returns, at times gradually, oftener rapidly, to the standard of health. When complications appear the fever may continue ten or twelve days. The defervescence is often marked by copious perspiration, an increased flow of urine depositing urates, or a spontaneous flux from the bowels. The catarrhal symptoms usually disappear within two or three days after defervescence, while the cough and expectoration may continue for an indefinite period.

Inflammatory lung complications, such as capillary bronchitis or catarrhal pneumonia, occur in from five to ten per cent of the cases. They occur oftener in old persons, and in those of feeble, delicate constitutions. Recrudescences of fading neuralgias are not uncommon.

Duration.—The mildest form of influenza lasts two or three days. The severe type runs its course in from four to ten days. When complications exist, weeks may elapse before recovery takes place.

ANALYSIS OF CHART.

The Temperature.—The fever is extremely variable. It ranges from 100° or 102° Fahr. in moderate cases, to 104° Fahr. in the more severe forms. It is, as a rule, higher at night than in the daytime. In the aged and infirm it is apt to run an adynamic course.

The Pulse.—The pulse is as changeable as the temperature. It is moderately increased in frequency.

The Nervous System.—In most epidemics great and early prostration is a marked symptom. Headache appears early, and is persistent. It is commonly frontal, sometimes general, and is severe in character. It usually increases in severity towards evening. Deep-seated pains, due to the general hyperæmia and catarrhal inflammation of the mucous lining of the cavities of the head, are referred to the frontal sinuses, antrum of Highmore, Eustachian tube and middle ear. Soreness and a bruised feeling in the limbs, and dull, tearing pains in the joints are almost constant symptoms; while stitches in the chest are not

CHART XI.—*Influenza.*

Nature:	Epidemic. Miasmatic-contagious.
Duration:	Two to ten Days.
Initial Symptom:	A chill, or chilliness alternating with heat.
Temperature:	102° to 104° Fahr. Remittent and variable.
Pulse:	Variable. Moderately accelerated.
Nose:	Sneezing. Abundant discharge. Redness. Epistaxis.
Eyes:	Lachrymation. Eyelids swollen and reddened.
Chest:	Paroxysmal racking cough. Myalgia. Dyspnea.
Nervous System:	Frontal headache. Sleeplessness. Mild delirium. Severe pains in the back and limbs.
Throat:	Sore throat. Pharyngitis. Tonsillitis. Hoarseness.
Digestive Tract.	Anorexia. Loss of taste. Coated tongue. Constipation or diarrhea.
Urine:	Diminished. Deposits urates.
Cutaneous Surface	Hot and dry. Hyperæsthesia. Sudamina. Herpes labialis.
Complications:	Capillary bronchitis. Catarrhal pneumonia. Parotitis.
Prognosis:	Favorable, except in very young or very old persons.
Relapses:	Not uncommon.
Recurrence.	A previous attack affords no protection.
Incubation.	From a few hours to two or three weeks.

uncommon. In severe cases the patients are generally restless and anxious, and there is marked insomnia. Mild delirium frequently occurs, but is mostly transitory. In the worst types there may be cramps, tremors and subsultus tendinum. Old neuralgias sometimes reappear during convalescence.

The Respiratory Tract.—The mucous membrane of the respiratory tract is more or less hyperæmic; the discharge from

the nostrils is abundant; the lachrymation and the sneezing are strongly marked. The sore throat is attended by more or less difficulty in swallowing and hoarseness. Troublesome laryngitis and chronic bronchitis sometimes remain as sequels. *Cough*, which is almost always a prominent symptom, is frequent and distressing in character. Occasionally it becomes spasmodic, simulating whooping cough. It is generally worse towards night. It is apt to be dry at the outset, but is attended by more or less muco-serous or muco-purulent expectoration as the disease progresses. *Dyspnea* is a not unfrequent symptom, and may be either of nervous origin from disturbance of the vagus, or due to existing complications.

Capillary bronchitis and catarrhal pneumonia are not uncommon complications. The latter often appears insidiously about the fourth or fifth day. Lobar pneumonia, as manifested by dullness, crepitus, bronchial respiration and rusty sputa, sometimes occurs as a late complication. Pleurisy, except as associated with lobar pneumonia, is rarely met with; at times it is associated with pericarditis. Localized collapse of the lung often occurs.

The Digestive Tract.—The thirst, loss of appetite, and impaired taste are due to the catarrhal state. Nausea and vomiting sometimes occur. Swelling of the parotid glands is occasionally present. The tongue is usually pasty, and coated with a whitish or yellowish-white fur. Tenderness in the epigastrium and constipation are present in a large proportion of cases. In some forms an intestinal catarrh gives rise to more or less diarrhea and colic pain.

The Urine.—The urine presents the characteristics of febrile urine in general. Its amount varies with the quantity of fluids ingested. As a rule, it is diminished; at times it becomes suppressed. It is frequently cloudy, and contains an abundance of urates towards the close of the disease.

The Cutaneous Surface.—At the outset of the attack, the skin is hot and dry; later on, sweating frequently occurs. Copious acid sweats are not uncommon during defervescence. Plentiful crops of sudamina frequently appear as a result of the abundant perspiration. An outbreak of herpes occasionally oc-

curs, and is a favorable indication. The general sensibility of the surface is not infrequently increased.

Morbid Anatomy.—The anatomical lesions of influenza are mainly restricted to the upper air-passages and bronchial tubes, and consist of congestion and catarrhal swelling of the mucous lining. The bronchial glands occasionally become enlarged. When complications exist, changes of lung tissue marked by hyperæmia, œdema, hypostatic congestion, splenization or hepatization, are observed.

Differential Diagnosis.—Although there are no special diagnostic signs that can be regarded as characteristic of influenza, its discrimination is, under ordinary circumstances, unattended with difficulty. The march of the epidemic, the large number of persons attacked, the prominence of nervous symptoms, the early prostration, and the annoying cough disproportionately severe in comparison with the physical signs, are distinguishing symptoms.

It may be confounded with simple catarrh, acute bronchitis, and typhoid fever.

Simple catarrhs are due to sudden changes in the weather, and usually appear as spring approaches, while influenza epidemics occur without regard to the seasons.

Acute bronchitis is a bilateral bronchial affection, characterized by a harsh cough with frothy, sometimes bloody, expectoration. Its physical signs are dry, sonorous or sibilant rales, succeeded after twenty-four or forty-eight hours by large and small, moist, mucous rales. When there is considerable secretion, bronchial fremitus is marked.

Typhoid fever differs from influenza, in having a typical temperature curve, a rapid pulse, a rose eruption, and pea-soup discharges.

Prognosis.—The prognosis varies in different epidemics, but is generally favorable except at the extremes of life. Various affections of the respiratory organs often appear as sequels. When death results it is mostly from complications.

Treatment.—*Prophylaxis.*—During the visitation of an influenza epidemic, the weak and the aged, and such as are enfeebled by chronic maladies, should be well taken care of. All susceptible individuals should remain indoors after sunset. The

iodide of arsenicum 3rd trit., arum drac. 1st trit., or sticta 1st dil., may be administered morning and evening as a preventive.

Principal Remedies.—*Camphor* may be of service during the first few hours of an epidemic. *Gelsemium* will be needed when the febrile symptoms are of a remittent character, chills run along the back, the face is flushed, the eyes are suffused, and there is a thin, watery, non-irritating discharge from the nostrils. *Arsenicum iodide*, when there are alternate chills and heat, and when the discharges from the nostrils are watery, irritating and corrosive in character. *Arsenicum alb.*, when the disease is located principally in the nose and larynx. The discharge from the nostrils is copious, watery and excoriating. There is obstinate ophthalmia, headache, burning in the frontal sinuses, larynx and trachea, and great prostration. *Mercurius vivus* at the outset, frequent sneezing with profuse coryza, short, dry, racking night cough, with painfulness of the whole thorax, and afterwards frothy, mucous expectoration. It is also of service when there is severe gastric catarrh and diarrhea. *Bryonia* in old people and when the affection is seated mostly in the large bronchi. There is distressing frontal headache, dry nasal catarrh, continuous, irritating, violent cough, worse in the daytime, frequently causing retching, pains in the chest, soreness and shooting, tearing pains on motion all over the body. *Potassium iodide* for painful violent sneezing with profuse, acrid, watery discharge, and lachrymation; and when there is a troublesome irritating cough, with oppression of breathing, and gray, sweetish-salt expectoration. *Sticta* for violent sneezing, with intense headache and conjunctivitis. And when the attacks are preceded by rheumatic pains and swelling of the small joints. *Eryngium aquaticum* for raw, smarting, burning sensations in the throat and larynx with constant irritating cough, and tenacious, yellow mucous expectoration. *Euphorbium* for frontal headache, watery discharge from eyes and nose, with burning and smarting pains in the back and limbs. *Eupatorium perf.* when the bone pains are excessive and there is intense bronchial irritation with severe cough. *Rhus tox.*, at the beginning when there is lameness or soreness in the extremities as if bruised; or a short, dry, night cough aggravated by motion or currents of cold air. *Wyethia* when there is dryness in the pharynx, with burning and dryness in the epiglottis, and a dry, hacking cough. *Senecio* for catarrhal

affections of the stomach and bowels, mucous coughs, or obstructed menstruation. *Carduus* when hepatic symptoms are marked. *Arum drac.* when laryngeal symptoms predominate. *Verat. alb.* when prostration is extreme. *Sabadilla* for excessive sneezing. *Euphrasia* or *allium cepa* for excessive lachrymation. *Hyoscyamus* for spasmodic cough, worse on lying down. *Conium*, after gelsemium, if the cough is relieved by the expectoration of a mass of frothy mucus with yellow nucleus. *Tartar emet.*, *kali bich.* and *nitrate of sanguinaria* for the bronchitis. *Phosphorus* when the disease is localized in the larynx or there is a tendency to pneumonia. *Sulphur*, *phos.* or *silphium* for non-tubercular pulmonary affections occurring as sequels.

Leading Indications.—The guiding symptoms for the different remedies may be compiled as follows:

Aconite.—Chilliness with burning heat in the head and face. High febrile excitement with full, hard, quick pulse. Anxiety and great restlessness. Distressing pressure at the root of the nose (*merc.*). Short, dry, racking cough from tickling in the larynx, with or without oppression. Stitches in the chest (*bry.*). Internal shuddering with dry, hot skin and tendency to uncover. Sudden suppression of perspiration. Coryza with sneezing (*sang.*). After exposure to cold west winds (*hepar*).

Allium cepa.—Violent sneezing with profuse acrid coryza (*merc.*). Smarting of the eyes with profuse bland lachrymation (*euph.*). Headache with coryza, upon entering a warm room (*puls.*). Hacking cough from inhaling cold air (*ars.*).

Ammonium carb.—Fluent coryza, with stoppage of the nose. Burning water runs from the nose (*merc. cor.*). Roughness and scraping in the throat (*caust.*). Cough, worse after midnight. In delicate women.

Ammonium mur.—Frequent sneezing. Watery, acrid discharge from the nose, corroding the lips (*merc. cor.*). Loss of smell. Loss of appetite. Hoarseness and burning in the larynx.

Arsenicum alb.—Frequent sneezing, with profuse watery discharge from the nose, corroding the lips and making the upper lip sore (*arum.*, *merc. cor.*). Profuse lachrymation and burning in the eyes (*aconite*). Inflammation of the eyes; photophobia. Extreme debility with dyspnoea on lying down. Great thirst

with chilliness after drinking. Desire for acids, cold water or spirits. Spasmodic cough with desire to vomit; worse after midnight, after eating and on lying down. Cough with frothy, tough expectoration. When coughing a pain extends from the lumbar region down into the thighs. Diarrhea; the evacuations excoriate the anus (*merc.*). Great restlessness and anxiety, especially at night.

Arsenicum iodide.—Chilliness alternating with flashes of heat. Sneezing with irritating, corrosive discharge. Short, dry cough with tightness in the chest; worse in the open air (*opp. puls.*). Puffiness of the lower lids and face (*apis, euphorb.*).

Arum drac.—Dryness and stiffness of the eyelids with smarting and burning. Shooting pains in the ears, with accumulation of mucus in the Eustachian tube. Dryness and smarting in the throat, with hawking and constant coughing (*sang. nit.*). Rattling of mucus in the larynx at every expiration, with cough. Paroxysms of dyspnoea at night, with aching in the chest. Great muscular weakness and prostration.

Badiaga.—Spasmodic cough, with sneezing and lachrymation. Painfulness of the left eyeball. Pressing of the hands upon the head while coughing. The cough is loose in the forenoon but tight towards evening and at night. Scrofulous inflammation of the eyes, with induration of the Meibomian glands.

Belladonna.—Dryness of the nose, with dull frontal headache. Frequent sneezing; sore throat and hoarseness. Throbbing headache, worse from motion and coughing. Great dryness of the mouth and throat. Swelling and tension of the upper lip (*calc.*). Hot skin, with inclination to perspire. Drowsiness with starting during sleep (*ars., merc.*). Barking cough (*dros., verbasum*). Dry, spasmodic, or hollow hoarse cough, worse at night (*dros.*).

Bryonia.—Headache in the morning, when first opening the eyes. Dry coryza with inflamed and ulcerated nostrils. Great irritability. Pain in all the limbs, aggravated by motion. Dry cough with pain and soreness in the pit of the stomach. Urination when coughing (*cina*). Tight cough, worse through the day, from entering a warm room and from motion. Desire to lie down and remain quiet.

Calcarea carb.—Frequent sneezing with coryza. Painless, morning hoarseness (*caust.*). Chest painful to the touch, and on inspiration. Loose cough with rattling of mucus in the chest. Night cough. Profuse head sweat when sleeping. Weight in the stomach soon after eating. In scrofulous persons and teething children.

Carbo veg.—Fluent coryza, with evening hoarseness. Burning in the eyes and profuse lachrymation (*merc.*). Beating or pulsating headache (*bell.*). Painful stitches through the head when coughing (*bry.*). Cough, at long intervals, aggravated by breathing cold air. Soreness of the chest, and heat of the body when coughing. Profuse and constant flow of stringy saliva.

Causticum.—Paroxysmal cough with pain in the hips and involuntary urination (*bry., cina*). Morning hoarseness; loud rales when coughing. Violent, hollow, dry cough, worse at night on getting into bed; better in bed, and from drinking cold water. Pain in the malar bones; stiffness and lameness in the jaws. Backache, especially in the coccyx. Much thirst for cold drinks. Aversion to sweet things; fresh meat causes nausea and water-brash.

Chamomilla.—Fluent, acrid discharge from the nose. Hoarseness and cough, from rattling of mucus in the bronchi. Suffocative constriction in the upper part of the chest with constant desire to cough. Stitches in the chest (*bry.*). Inability to swallow solid food (*opp. ignatia*). Children want to be carried and are very irritable.

Cimicifuga.—Heat in the head with fluent, watery coryza. Stoppage of the nose, with great sensitiveness to the open air. Severe pain in the head and eyeballs, aggravated by motion (*bry.*). The top of the head feels as if it would fly off (*bapt.*). Chilliness with aching pain in the limbs. Excessive muscular soreness (*arn.*). Cough excited with every attempt to speak (*phos.*). Alternate constipation and diarrhea (*bry.*).

Cina.—Violent sneezing. The child don't want to be touched. Dry, hacking cough at night. Gagging cough in the morning after rising. White turbid urine. Worm affections (*chenop., merc.*)

Conium.—Burning in the eyes. Hacking, almost constant,

cough; worse at night when lying down (*hyos.*). Palpitation of the heart after drinking. Intermittent flow of urine. Exhaustion and faintness. In aged persons.

Drosera.—Pressing headache in the temples. Hoarseness with oppression of the chest, worse from talking (*caust.*, *phos.*). Barking cough (*rumex*). Cough with vomiting (*ipeccac.*, *tart. emet.*). Rheumatic pain in the arms, at night. Patient supports the chest with the hands (*eupat.*).

Eryngium.—Severe headache with fluent coryza. Raw, smarting, burning sensations in the throat and larynx. Irritating cough with expectoration of tenacious yellow mucus.

Eupatorium perf.—Coryza, with sneezing, hoarseness and aching pains all over as if bruised (*arn.*). Headache with pain and soreness of the eyeballs; photophobia. Cough with retching (*dros.*). Hacking cough in the evening, with soreness in the chest (*caust.*). Cough before and after meals. Intense aching and soreness in the back and limbs (*arn.*). Soreness in the region of the liver (*bry.*, *merc.*).

Euphorbium.—Soreness in the back of the head. Burning, as from a flame, from the throat to the stomach. Spasmodic cough, with stitches extending from the pit of the stomach to both sides of the chest. Dry, hollow cough from tickling in the chest or throat. Profuse watery diarrhea with colic and great prostration. Dysenteric symptoms (*merc.*).

Euphrasia.—Profuse, fluent, bland coryza, with scalding tears (opp. *ars.*); aversion to light. Burning in the eyes with lachrymation. Dull frontal headache (*merc.*). Catarrhal hoarseness (*hepar*). Dry, tickling, laryngeal cough during the day, relieved by eating and drinking. Cramp-like pains in various parts.

Gelsemium.—Chilliness along the spine; cannot leave the fire without feeling chilly. Sneezing, with tingling, especially in the left nostril (*graph.*). Stoppage of the right nostril; irritating discharge from the left nostril with scalding sensation. Sensation as of a band drawn tightly around the head above the ears (*merc.*). Bruised feeling in the eyes (*bry.*). Shooting pains in the ears when swallowing. Sore throat, with collection of mucus. Hard, painful cough with soreness in the chest. Neuralgic and rheumatic pain in the extremities (*cimicifuga*,

rhus). Copious discharge of limpid urine relieving the headache (*phos. acid*). Liability to take cold from every change in the weather (*dulc.*).

Hepar sulph.—Tensive headache above the nose (*merc.*). Inflammation of the nose; coryza; acuteness of sense of smell. Darting pains in the ears, with cracking noises when blowing the nose. Feeling of sand in the eyes (*sulph.*). Roughness and scraping sensations in the throat (*nux*). Cough with constant hoarseness. Sensation as of a fishbone in the throat (*nit. acid*). Cough caused by uncovering any part of the body (*rhus*). Laryngo-tracheal catarrh. Great desire for acids, especially vinegar (*bry.*, *nux*).

Hydrastis.—Dull, heavy frontal headache (*merc.*). Sneezing, with fullness over the eyes, and profuse secretion of tears (*cuph.*). Copious discharge of thin watery mucus, with smarting and rawness in the nose, worse in the open air. Rawness, soreness and burning, in the throat and chest (*merc. cor.*). Dry, harsh, rattling from tickling in the larynx. Great weakness and prostration. In weak and debilitated individuals.

Hyoscyamus.—Pressing pinching at the root of the nose and malar bones. Dry, spasmodic cough, worse at night and on lying down, relieved by sitting up (*puls.*). In old persons.

Iodine.—Dry coryza, becoming fluent in the open air. Catarrhal deafness. Hoarseness with constant hemming and hawking. Dry, morning cough from tickling in the larynx and burning in the chest. Swelling of the cervical and bronchial glands. Progressive emaciation.

Ipecacuanha.—Coryza with stoppage of the nose. Incessant, dry, titillating cough with dyspnoea. Rattling of mucus in the chest. Pale face, with blue margins around the eyes. Indescribable sick feeling in the epigastric region. In delicate children.

Iris vers.—Constant sneezing with neuralgia of the head, eyes and temples. Headache with blurred vision. Dull, heavy throbbing pains in the forehead and right temple (*bry.*). Dry, tickling cough with smarting and burning in the throat. Tasteless or acid eructations. Light, mushy, painless stools. Burning in the anus as if on fire after stool. Severe, shooting pains, especially in the small joints.

Kali bich.—Frontal headache, usually over one eye (*sang.*). Lateral headache in small spots. Fluent, acrid coryza, excoriating the nose and lips (*arum, merc. cor.*). Sensation as of a hair in the nose (*hydrastis*). Edematous swelling of the eyelids (*apis*). Pressive pain at the root of the nose. Tickling in the larynx causing coughing. Rattling cough with viscid stringy expectoration. Hoarseness in the morning (*caust.*). Feeling of coldness in the stomach and bowels. Lameness in the right arm; wandering pains (*puls.*).

Kali hyd.—Violent sneezing, and running of acrid water from the nostrils (*allium*). Sensation of fullness and tightness at the root of the nose, with throbbing and burning pains in the nasal and frontal bones (*kali bich.*). Burning in the eyes with profuse lachrymation. Rawness in the larynx; stitches from the sternum to the back. Short, dry, hacking cough with whitish and greenish expectoration.

Lachesis.—Fluent coryza and lachrymation (*ars., kali hyd.*) Dryness of the mouth with burning as from pepper. Throat sore, especially when touched (*apis*). Frontal headache with trifling discharge from nostrils. As soon as a profuse discharge sets in the head and throat symptoms ameliorate. Pain in the left ear when swallowing. Dry, spasmodic, nightly cough, aggravated by sleep. Gaggling, persistent cough from tickling in the throat. Stitching pain in hemorrhoidal tumors when coughing or sneezing.

Lycopodium.—Catarrh of the frontal sinuses; pressing or tearing frontal headache, especially in the right side of the head. Redness of the eyelids with lachrymation. Violent coryza with acrid discharge (*arum, merc.*). Accumulation of mucus in the throat. Lemon-colored expectoration. Sore, pressive pain in the region of the liver (*chel.*). Swelling of the cervical glands (*merc.*). Dry cough day and night as if from fumes of sulphur in the larynx. Hepatization of the lungs (*bry., phos.*).

Mercurius.—Frequent sneezing with profuse, fluent, corrosive coryza (*arum, kali hyd.*). Burning in the eyes and profuse flow of tears. Catarrhal headache. Inflamed and ulcerated tonsils (*bell., hepar*). Hoarseness with rawness and tickling in the larynx (*phos.*). Rheumatic pains with sore throat, not relieved

by sweating. Stitches in the right side of the chest when sneezing or coughing (*bry.*). Violent night cough. Flying pains in all parts of the body from coughing. Constipation, or mucus, bilious diarrhea. Violent and constant thirst for cold drinks. In children and old people.

Nux vom.—Coryza, fluent in the morning and during the day, but dry at night. Dry, racking cough with headache as if the skull would burst; great soreness of the epigastrium. Coryza with sneezing, worse in the morning and after eating. Sour taste in the mouth every morning (*bry.*). Great debility with over-sensitiveness of all the senses (*cinch.*). Drowsiness in the daytime and after eating.

Phellandrium.—Headache, with pain as from a weight on the top of the head; aching and burning in the temples above the eyes. Pain in the eyes with lachrymation, photophobia and conjunctivitis. Hoarseness with roughness in the throat (*hepar*). Dry cough with shortness of breath and stitches in the chest. Scanty urination with violent burning after a discharge.

Phosphorus.—Throbbing headache; headache over the left eye (*aconite*); worse in the evening. Frequent sneezing, with alternately fluent and dry coryza. Nose swollen, dry and stopped up. Difficult hearing, especially of the human voice. Hoarseness and roughness of the voice (*caust.*, *hepar*). Dry, tickling cough with tightness across the chest, relieved by pressure upon the external walls. Cough worse, before midnight, from reading, laughing or speaking, and on going into the cold air (*bry.*, *rumex*); better after sleeping (*opp. lach.*). Mucous rales in both lungs, especially in the lower lobes (*ipecac.*, *tart. emet.*).

Phytolacca.—Pressive, sore pain in the forehead, worse on the right side. Sensation of soreness, deep in the brain. Burning, smarting in the eyes, with lachrymation. Thin, watery discharge from one nostril with stoppage of the other (*gcls.*, *sepia*). Drawing sensation about the root of the nose. Great pain in the root of the tongue when swallowing. Excruciating pain through both ears when swallowing. Dry, hacking cough, with hawking, excited by tickling in the larynx and dryness in the pharynx. Rheumatic pains in the extremities. Derangement of the digestive organs.

Pulsatilla.—Bursting, throbbing headache in the forehead and temples, relieved by pressure (*apis*). Fluent or dry coryza, with frequent sneezing, and loss of taste and smell (*sulph.*). Stoppage of the nose in the evening and in a warm room. Inflammation of the eyes with profuse lachrymation (*euph.*). Darting, tearing, pulsating pains in the ear at night (*merc.*). Roaring in the ears, as if from the rushing of waters. Dry cough, at night or in the evening, especially after lying down (*hyos.*). Loose cough, with vomiting of mucus, and nightly diarrhea. Aversion to fat food (opp. *nux*). Gastric disturbance from rich food or pastry (*nux*). Drawing, tearing pains frequently shifting from one part of the body to another (*kali bich.*). Especially adapted to females and children.

Rhus tox.—Frequent, violent, spasmodic sneezing. Hot, acrid discharge from the nose. Aching, pressive pains in the eyes (*caust.*); oedema of the lids (*apis*). Swashing and jarring sensations in the brain (*natrum*). Short, dry cough from tickling in the bronchi (*rumex*). Putting the hands out of bed brings on the cough (*hepar*). Pain and aching in the limbs, worse during rest, better during exercise. Great restlessness, must change position often (opp. *bry.*). Typhoid symptoms.

Rumex crisp.—Fluent coryza, with violent sneezing, and painful irritation of the nostrils; worse towards evening and at night. Dry, scraping sensation in the throat, with copious secretion of mucus in posterior nares. Hoarseness, with pain and rawness in the larynx (*phos.*). Violent, dry cough, excited by tickling in the larynx (*sang.*), often almost continuous; worse at night from exposure to cool air, and on lying down (*dros., phos.*). Brown and watery morning diarrhea (*sulph.*). Great debility, with restlessness and extreme sensibility to the open air (*rhus*).

Sabadilla.—Headache, with fluent coryza. Lachrymation, with redness of the eyes. Chilliness, with heat and redness of the face. Cough worse on lying down (*hyos., lach.*). Burning and stitches in the chest. Red spots on the chest. Pain in the bones as if scraped (*rhus*). Debility, with heaviness and relaxation of the body. Aggravation of symptoms at the same hour every day (*cedron*).

Sanguinaria.—Fluent coryza, with frequent sneezing (*euphrasia*). Smell in the nose like roasted onion. Circumscribed

redness of the cheeks. Looseness of the teeth with ptyalism (*merc.*). Feeling of dryness in the throat; constant tickling at the entrance of the larynx; ulcerated sore throat. Catarrhal affections of the inner ear and Eustachian tube. Wheezing cough, worse at night. Dry, hacking cough from tickling in the throat-pit (*rumex*). Severe and persistent dyspnoea, with inclination to take deep inspirations. Diarrhea following the coryza, and relieving the cough. Desire for piquant, highly seasoned food. Wandering rheumatic pains, worse at night and from motion. Pneumonia with extensive hepatization (*phos.*).

Sanguinaria nitrate.—Violent sneezing with profuse watery discharge from the nostrils (*euph.*). Burning pain and rawness in the nose (*ars.*). Heat and burning in the eyes, with dimness of sight, and profuse lachrymation. Sore, aching pain in the right eyeball, extending into the supra-orbital region. Burning pain in the forehead and at the root of the nose. Catarrhal affections of the internal ear and Eustachian tube. Soreness and roughness of the throat, with sense of constriction and difficulty of swallowing. Accumulation of mucus in the throat and chest (*kali bich.*). Tension and burning behind the sternum with desire to cough (*rumex*). Cough with expectoration of large quantities of thick, yellow, sweetish mucus. All the symptoms are worse at night (*merc.*).

Senega.—Aching pain and tension in the eyeballs. Weakness of the eyes with burning and lachrymation. Acuteness of the sense of hearing (*canm. ind.*). Dry, shaking cough from tickling in the larynx. Rattling cough with profuse secretion of mucus (*tart. emet.*). Cough with expectoration of slate-colored mucus. In old people.

Sepia.—Fluent coryza with frequent sneezing (*allium, sang.*). Obstruction of the nose and violent, dry coryza. Swelling and redness of the eyes, with lachrymation; worse morning and evening, better during the day. Intense frontal headache. Herpetic eruptions on the lips. Painful sensation of emptiness in the stomach and abdomen (*hyd., ignat.*). Hoarseness with cough from tickling in the larynx (*hepar, phos.*). Dry, tickling cough at night (*hyos.*), followed by expectoration of mucus with temporary relief (*ipecac.*). Morning cough, with greenish, salty

expectoration. Stitches in the chest when coughing (*bry.*). Pain in the chest relieved by pressure (*opp. calcarea*).

Silphium.—Sneezing, with discharge of acrid mucus from the nose. Scraping, tickling sensations in the throat. Tightness of the chest; spasmodic cough; *copious* expectoration of yellow mucus. Profuse expectoration of water mixed with light-colored, stringy, tasteless mucus.

Spigelia.—Fluent coryza, with dry heat and no thirst. "Burning pain in the right side of the head extending into the eye. Hyperæsthesia of the fifth nerve. Otagia with pressive pain as from a plug. Toothache aggravated by cold air or cold water (*opp. coffea*). Dry, hard, night cough with dyspnoea. Headache with hoarseness; anxiety with palpitation of the heart.

Spongia.—Fluent coryza with frequent sneezing (*allium, sang.*). Dry coryza with stoppage of the nose (*nux*). Pain in the chest, with rawness in the throat when coughing. Dry, hollow, barking or wheezing cough, relieved by eating or drinking. Hoarseness; larynx sensitive to the touch (*luch.*). Swelling of the sub-maxillary glands (*merc.*).

Stannum.—Dry coryza; stoppage high up in the nose (*lyc.*). Neuralgic headache; the pains commence lightly, increase gradually to a high degree, and decrease again as slowly. Dryness and rawness of the throat. Hoarseness and roughness in the larynx (*phos.*). Scraping cough with profuse greenish, sweetish expectoration. Feeling of great weakness and exhaustion in the chest. Faintness with weakness of the voice, worse from singing or talking (*arum*).

Sticta.—Incessant sneezing, with a feeling of fullness in the right side of the forehead down to the root of the nose, with tingling in the right nostril. Splitting frontal headache. Dry, racking cough in the evening and at night, excited by inspiration. Cough from tickling in the right side of the trachea, with oppression of the chest. Excessive dryness of the mucous membrane. All symptoms worse in the afternoon; better in the morning and in the open air. Sleeplessness.

Sulphur.—Fluent coryza; coryza with stoppage of the nose. Itching and burning in the nostrils, as if sore. Dry ulcers or scabs in the nose. Stitches in the throat when swallowing (*bell.*).

Dry cough in the evening on lying down, with itching in the bronchi. Stitches in the chest extending back to the left scapula (*kali carb.*). Chronic cough with mucous rales. Sudden arrest of breathing when turning in bed. Tearing pains in the limbs, muscles and joints from above downward (opp. *ledum*). Morning diarrhea, driving the patient out of bed hurriedly.

Tartar emet.—Chilliness, with sneezing, fluent coryza and loss of taste and smell. Much rattling of mucus in the chest (*ipecac*). Oppression of breathing, relieved by expectoration. Cough followed by yawning (*nux*), especially in children. Great restlessness. The child must be carried, it cries if touched (*cham.*, *staph.*). Gastric symptoms. Cyanosis (*cuprum*).

Veratrum alb.—Icy coldness of the forehead and nose. Smell as of smoke before the nose; painful dryness of the nose; frequent, violent sneezing. Difficult respiration with tightness and constriction in the chest. Deep, hollow cough, occurring in shocks. Icy coldness of the extremities. Sudden sinking of strength (*ars*). Capillary bronchitis (*chel.*); œdema of the lungs (*moschus*).

Wyethia.—Dryness of the throat. Burning and tickling in the epiglottis. Dry, hacking cough, caused by tickling in the epiglottis. Pain in the forehead over the right eye. Sharp pain and soreness in the right hypochondrium. Diarrhea with dark brown evacuations.

HYGIENIC AND DIETETIC TREATMENT.

Individuals suffering from an attack of influenza should remain indoors. The diet—from which meat must be excluded—should be plain and easily digested. The various fruit syrups may be used as drink in moderate quantities. Weak wine-whey is frequently useful. When the stomach is irritable koumyss will prove grateful. Sound claret may be allowed, if desired by the patient. Free inunctions about the brow and over the bridge of the nose, are of service when the coryza is excessive. When the head pains are severe, warm applications or a flannel cap may be used. The tickling cough, which is oftentimes very annoying, may be allayed to a considerable extent by resorting to steam inhalations.

LECTURE XVIII.

Typhus Fever.

You will doubtless remember that I completed the history of the miasmatic-contagious fevers at my last lecture. To-day, I will commence the history of the third class of fevers—the *contagious fevers*. The first in order in this class is *Typhus Fever*.

Definition.—Typhus fever may be defined as an acute, highly contagious fever, having an average duration of fourteen days, due to an unknown specific poison, arising usually in connection with overcrowding, imperfect ventilation and filth, and occurring in more or less extensive epidemics. It is characterized by sudden invasion, usually with a chill; great and early prostration; deeply flushed face; frontal headache; injected eye; pain in the back and *thighs*; pungent heat of the skin, with an ammoniacal odor; *mulberry-rash* on the fifth day, first on the sides of the chest or abdomen, frequently becoming petechial on the eighth, ninth or tenth day; furred tongue; usually constipation with flat or even scaphoid abdomen; a high temperature and a quick pulse; after the first week, delirium; stupor or coma; a dry and brown tongue; tremors and involuntary discharges. Death may take place from either coma or syncope, or as a result of complications. No constant specific lesions are found upon examination after death. Relapses are infrequent; a second attack is of rare occurrence. The incubation is from five to fourteen days.

Synonyms.—It has been known and described as: Infectious fever. Ship fever. Emigrant fever. Contagious fever. Pestilential fever. Petechial fever. Putrid continued fever. Epi-

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demic fever. Camp fever. Malignant hospital fever, and Irish ague.

History.—Although the description given by Thucydides, of a pestilential fever which prevailed in Athens at the time of the Peloponnesian war, resembles in outline that of typhus fever, the first satisfactory account on record is that given by Fracastorius in 1501, of a disease which spread from Cyprus into Italy and overran all Europe, and had prevailed for over twenty years. During the sixteenth century many accounts were published of destructive epidemics that prevailed in Tuscany, Hungary and France, spread all over the continent, and extended to Great Britain and Ireland.

Between the years 1609 and 1638, all Europe was devastated by famine and by a contagious fever which resembled typhus.

The great plague of London in 1665 was preceded and followed by a continued fever, which bore a striking resemblance to typhus. In Ireland the disease was described as the "Irish Ague." About the beginning of the last century, a continued fever resembling typhus spread throughout Europe and the British Isles, and was most prevalent in over-crowded localities. From 1735 to 1803 several severe and fatal epidemics appeared in Ireland, and extended into various parts of England. From 1816 to 1819 wide-spread epidemics occurred in Ireland and in Northern Italy, while limited epidemics appeared in different parts of Europe. During the six years following 1826 it was endemic in Great Britain and Ireland, but became again epidemic in 1842 and 1846. Wide-spread epidemics appeared in Ireland, Russia and Prussia, in 1847, 1857 and 1868. From 1854 to 1856 typhus prevailed very extensively among the armies in the Crimea.

Restricted epidemics have appeared on this continent since the beginning of the present century. The first epidemic broke out in the Boston poorhouse, in 1816. Since that time it has repeatedly appeared in consequence of direct importation. It has raged on several occasions at New York, particularly in 1818, 1825, 1827 and 1861-65. It appeared at Buffalo in 1850-52, and at Philadelphia in 1820, 1836, 1864 and 1880.

Geographical Limits.—The chief geographical center of typhus fever is Ireland. Other centers are found in Northern

Italy, and the Baltic provinces of Russia. The disease has spread from these centers throughout Europe, Asia and the British Isles; and has been observed, under circumstances of direct importation, principally in the coast cities of the Northern States of this country, in the neighboring Dominion of Canada and in the West Indies. It has not, as yet, been observed in the Southern States, Africa or Australia.

Etiology.—The causation of typhus fever may be conveniently studied under the two divisions, predisposing and exciting causes.

1. *The Predisposing Causes.*—Of the predisposing causes, over-crowding, filth and starvation are the most important. The majority of the great epidemics of typhus have generally occurred in times of scarcity among the poor and under-fed of large cities, living huddled together in crowded and illy-ventilated apartments. Fatigue, want of sleep, frequent exposures, previous illness, anxiety and other depressing emotions materially predispose to the disease. Hence medical students, hospital internes, nurses, nervous people and individuals recovering from even slight illness, not infrequently contract typhus fever. Typhus is for the most part a disease of adult years, although all periods of life are liable to its attacks. It is essentially a disease of cold and temperate climates, and is most prevalent during the winter months. Damp or marshy soil favors its development.

2. *The Exciting Cause.*—The nature of the exciting cause of typhus fever remains, as yet, unknown. The majority of observers, however, agree in describing the infecting principle as an organized germ, emanating from the body of an affected individual, and capable of indefinite reproduction. And careful clinical observation has established the fact that this specific typhus poison may be communicated directly from the sick to the healthy in the expired air, and in the cutaneous exhalations of patients. The peculiar pungent odor conveyed by the breath and emitted from the bodies of typhus patients is, as a rule, strong in proportion to the intensity of the poison. The germs are believed by many, capable of retaining their vitality for a great length of time, and of being carried in the bedding and in the clothing of patients, which act as *fomites*. In this way it is

argued that houses, ships and hospital wards may readily become hot-beds for the production and spread of the disease. Loomis, and other more recent writers, however, are doubtful whether the disease can be communicated by fomites alone, even when highly impregnated, and maintain that it is necessary for the subject of the contagion to have been brought in contact with an infected person, or within the atmosphere immediately impregnated with his exhalations. The contagious distance of typhus fever—the distance at which the specific poison may be transmitted by the breath or cutaneous exhalations, through the atmosphere, in the open air—is somewhat less than that of small-pox, which has been demonstrated by actual experiment to be two and one-half feet.

In large and well-ventilated apartments the risk of contagion is greatly lessened; while in small, badly-ventilated rooms, it is largely increased. There are no facts to prove that the disease is diffused from one house to another or from hospitals to adjoining houses except by intercommunication. It is occasionally contracted in the dissecting room, by dissecting bodies dead with typhus.

The danger of contagion is slight during the first week of typhus, but is largely increased from the close of this period, until convalescence becomes established. In the majority of instances the disease attacks an individual but once. All persons, at all times, are not equally susceptible. A special constitutional idiosyncrasy occasionally exists, which affords an immunity.

The length of the *period of incubation* varies from five to fourteen days.

Summing up the known facts in the etiology of this fever, we are led to state:

1. That there exists a specific typhus poison, which is undoubtedly present in the body exhalations and in the expired air of typhus patients.
2. That it is communicated only by personal contagion—the contagious distance being about two feet.
3. That a concentration of the poison is necessary to produce the infection, and that where there is free ventilation personal contagion is confined to limited areas.
4. That it is taken into the body mainly through inspired air.
5. That over-crowding and deficient ventilation, even when

conjoined with innutrition, do not produce typhus, but favor, by deteriorating the constitution, its extension and increase its severity.

6. That it ordinarily occurs but once in a life time.

7. That in this country it is, as a rule, an imported disease.

Clinical History.—The advent of typhus fever is usually abrupt. Occasionally there is a prodromal stage of a few days duration, marked by general lassitude, headache, anorexia, vertigo and nocturnal restlessness. In a majority of the cases there are no prodromes, the disease being ushered in by a short, sharp, sudden chill or by chilly sensations. At times the chill or chilly sensation recurs at irregular intervals for several days; and, in children, repeated vomiting not unfrequently occurs. A sense of extreme prostration soon follows the initial chill, attended, as a rule, by intense and steadily increasing frontal headache. The fever increases rapidly, and the temperature may rise during the first twenty-four hours as high as 105° Fahr. or 106° Fahr. Notwithstanding the high temperature, the patient frequently complains of a sensation of coldness. The skin becomes hot, the face flushed, the eyelids swollen and injected, and the respirations slightly hurried. Occasionally there is sneezing with slight cough and soreness of the throat. More or less severe pain in the back, and sore, dull pains in the limbs, especially in the thighs, are constantly present. The tongue is at first pale, swollen, and covered with a whitish fur; later it is covered with a yellowish-brown coating, and displays a tendency to become dry, brown and fissured, and oftentimes tremulous. Nausea is sometimes present; vomiting rarely occurs. The bowels are, as a rule, constipated, exceptionally there is slight diarrhea. The spleen becomes enlarged early in the disease, and there is slight tenderness in both hypochondria.

During the first week of the fever the temperature varies from 103° Fahr. or 104° Fahr. in the morning, to 104° Fahr. or 106° Fahr. in the evening.

The pulse is accelerated from the beginning of the attack, ranging from 100 or 110 in the morning, to 120 or 130 in the evening. It is at first full, but soon becomes soft and compressible; later it grows feeble, and is not unfrequently dicrotic. As the fever progresses the expression of countenance becomes dull

and stupid, and the cheeks assume a mahogany appearance. The sleep is disturbed, and between sleeping and waking there is slight delirium.

Between the fourth and eighth, usually on the fifth day, the characteristic eruption appears, first upon the sides of the chest and abdomen, gradually extending over the whole anterior portion of the body, except the neck and face. It consists of numerous roseola-like spots, varying in size from a mere point to three or four lines in diameter, and is more marked upon the trunk than on the extremities. It is oftener wanting in children than in adults; in the former it frequently resembles the eruption of measles. At first, the spots are of a dark red or dirty rose-color, appear slightly raised above the surface of the surrounding skin, and temporarily disappear on pressure. After two or three days they become darker in color, and appear as faint, irregular, dirty brown stains. They are now no longer elevated, and do not entirely disappear on firm pressure. A faintly reddish ill-defined mottling or marbling, appearing as if it were a little distance below the surface of the skin, between the spots or groups of spots is generally present. The spots and the sub-cuticular mottling may exist separately and alone, usually they occur together and constitute the "mulberry rash" of typhus.

The course of the eruption is typical. The rash is fully developed in less than forty-eight hours, and its copiousness represents generally a corresponding gravity of the disease. Each spot or patch remains visible from its first appearance until convalescence is established or death takes place. In a certain proportion of cases the typhus spots become petechial, and in severe grades of the fever they may be converted into dark red stains. This occasional change in the character of the eruption has led to the erroneous title, "petechial typhus."

At the close of the first week the headache disappears, and delirium, usually low muttering, sometimes acute and boisterous, comes on. Occasionally the delirium is active and persistent from the start, and physical restraint is rendered necessary. About the middle of the second week as the symptoms continue to deepen, the intense nervous excitement abates. The patient now becomes drowsy, passes into a state of "coma vigil," and lies for hours apparently unconscious with the eyes open as

though awake. This "coma vigil" or watchful coma is a state of apparent, rather than complete coma, from which the patient can be easily aroused. It is usually attended with great mental activity, and is of unfavorable omen. Persons of active brain frequently have the most distressing fancies during this period. If the case terminates in recovery the patient emerges with a distinct remembrance of all the horrid visions that passed before his imagination. At this stage of the fever the face appears flushed, the conjunctivæ are injected, and there is a dusky pallor about the nostrils and lips. The pains in the limbs and back are no longer complained of, and involuntary twitchings occur. The respirations become quickened, and there is a dry, annoying cough with scanty mucous expectoration. The breath and cutaneous exhalations give off an *ammoniacal* or "mouse-like" odor. The heart-sounds become feeble and indistinct; the pulse is small and ranges from 110 to 140 per minute. The tongue is dry and fissured, and is protruded with difficulty. Swallowing becomes difficult on account of dryness of the pharynx; and sordes collect upon the teeth and lips. The urine becomes scanty and high colored, and either collects in the bladder or dribbles away.

As the disease progresses, if the case is tending towards a fatal termination, the stupor deepens, the coma becomes more and more profound, and the patient lies on the back utterly indifferent to everything going on around him. The tongue can no longer be protruded from the mouth, the hands tremble, the extremities are cold, and the muscular prostration becomes extreme. The pulse rises to 140 or 150 per minute, and is small and weak; at times it becomes irregular. The temperature which has remained with but slight morning and evening variation at 105° Fahr., may rise to 107° Fahr. or 108° Fahr. before death.

When a fatal termination takes place, which is possible as early as the fifth day, or before the end of the first week, but mostly between the tenth and seventeenth days, the mode of death is by coma, by asphyxia, or by heart failure.

In cases that tend towards a favorable termination there occurs, usually about the fourteenth day, sometimes as early as the tenth day, a sudden amelioration of all the symptoms, associated with a critical defervescence. The pulse and temperature suddenly fall, and reach the normal or fall slightly below it, in from one to two days. The stupor and coma rapidly disappear, and

after a prolonged and refreshing sleep, the patient awakes to consciousness as from a long and oppressive dream. The urine becomes increased in quantity, and there is a copious deposit of urates. The eruption fades and slowly disappears. The tongue cleans and becomes moist at the edges. The appetite improves, the strength begins to return, and the patient enters upon a rapid convalescence. The hair frequently falls off as recovery takes place. Deafness and lack of mental vigor which are apt to continue far into convalescence, gradually disappear.

Abortive cases of typhus presenting all the characteristics of the initial stage of the disease, occasionally appear during the prevalence of typhus epidemics. Usually there is no delirium, and at the end of the second, third or fourth day, a critical defervescence occurs, accompanied by sweating and diarrhea.

True relapses are rare.

Complications.—The complications of typhus fever like those of typhoid fever are numerous and important, and are not unfrequently the cause of death. They vary in different epidemics; in some they are either cardiac or pulmonary; in others they are all cerebral.

The pulmonary complications of typhus, among which may be mentioned, laryngitis, bronchitis, lobular pneumonia, pulmonary gangrene and phthisis, always approach insidiously. Hurried respiration and lividity of the face are not uncommon danger signals. In all cases you will do well to institute daily physical exploration of the chest.

Laryngitis may occur as an occasional complication. It usually appears as an acute oedema glottidis, although at times it is croupous in character. Its advent, which is always insidious, should be anticipated whenever there is great swelling of the glands of the neck or extensive tumefaction of the mucous membrane of the pharynx.

Bronchitis may occur at any period of the fever. It is devoid of danger so long as it is confined to the larger bronchial tubes. But when it becomes diffuse and extends into the smaller tubes, it may lead to atelectasis and secondary lobular pneumonia, and so diminish the breathing capacity as to cause death.

Lobular pneumonia.—The pneumonia of typhus is lobular in character. It is frequently preceded by bronchitis and displays a tendency to terminate in abscess or pulmonary gangrene. It

is manifested by the usual signs, dullness confined to one lung (usually the upper part), bronchial respiration and rusty sputa.

Pulmonary gangrene is an occasional, but generally fatal complication. Its signs are, dullness on percussion, with coarse mucous rales, greenish or brownish and horribly foetid expectoration, rapid and oppressed breathing, pallor and great prostration. Purulent and serous pleuritic effusions occasionally occur, and sometimes phthisis supervenes during convalescence.

Meningitis is the principal cerebral complication. It is most liable to occur during the second week of the fever, and is oftener met with in children than in adults. Its presence is manifested by intense bi-lateral headache, with restlessness which shows itself by *constant attempts to get out of bed*, redness of the face and eyes, intense sensitiveness to light and sound, contracted pupils, with contractions of the flexor muscles of the arm and leg, followed by somnolence lapsing into coma. Dilatation of the pupils with slow stertorous breathing, and an intermitting almost imperceptible pulse, immediately precede death.

Feebleness of intellect and *attacks of mania*, show themselves in a small proportion of cases during convalescence. They are commonly transient, lasting only a few days or weeks.

Paralysis may occur as a sequel of typhus, but usually terminates within a limited period after recovery. *Hardness of hearing*, which is a frequent attendant during the course of the fever, commonly disappears as convalescence becomes established. Occasionally permanent deafness occurs as a result of inflammation of the external or of the middle ear. *Transient dimness of vision* has been observed in some epidemics, and *perforating ulceration* of both corneæ occasionally occurs as a result of prolonged exposure of the eyeballs.

Croupous nephritis occasionally occurs during the course of typhus. Its occurrence is indicated by urinary suppression, and by the presence of albumen and of hyaline, and blood casts in the urine.

Glandular swellings occasionally occur as complications, and are, as a rule, most frequently observed in adults. They may appear either in the early days of the fever or immediately after the crisis. They are most apt to involve the parotid and the sub-maxillary glands; less frequently the mammæ and the axillary and inguinal glands become implicated. The swellings,

usually form rapidly, and speedily tend to suppuration; occasionally resolution occurs. When *parotitis* occurs, it is not infrequently associated with facial erysipelas or with extensive inflammatory oedema of the neck, and oedema of the glottis.

Sub-cutaneous extravasations of blood are not uncommon in some epidemics. While hemorrhages from the nose, bowels, kidneys and uterus, have been occasionally observed.

Boils, and diffuse inflammation of the sub-cutaneous tissues resulting in purulent infiltration, are not infrequently met with in some epidemics. Wounds and ulcerated surfaces, and even parts not subjected to pressure, may at times, in consequence of arterial thrombosis, become gangrenous.

Pyæmia with purulent deposit in the smaller joints is an occasional though rare occurrence. It commonly appears about the time of the crisis and is manifested by severe chills, rapid and feeble pulse, jaundice, delirium, great prostration and redness, tenderness and swelling of the joints.

Bed-sores, which are common and troublesome complications of typhoid fever, are rarely present in ordinary typhus fever. In protracted cases, however, they are apt to appear, especially over the sacrum and trochanters, and may, if extensive, lead to exhaustion and death.

Duration.—The average duration of typhus fever is from thirteen to fifteen days. It is shorter in childhood and youth, than in middle and advanced life. Mild cases may terminate at the end of the first week or at the beginning of the second week. Uncomplicated cases rarely last longer than twenty days.

Complications may protract the course of the disease to four, five or even six weeks. The day of crisis is usually between the tenth and sixteenth days. The mean duration of the fever, which is fourteen days, is usually longer at the beginning than at the close of an epidemic.

ANALYSIS OF CHART.

The Nervous System.—*Headache* is one of the earliest and most constant symptoms of typhus. It is usually present at the onset of the attack, and is frequently associated with vertigo. It is dull or heavy in character, and is located mainly in the forehead and temples; exceptionally it is confined to the vertex or occiput. It remains, as a rule, persistent during the first week

CHART XII.—*Typhus Fever.*

Nature:	Epidemic. Highly Contagious.		
Initial Symptom:	A short, sharp, sudden chill.		
Stages:	First Week.	Second Week.	Third Week.
Face:	Flushed. Mahogany colored cheeks	Dull, heavy expression	Countenance natural.
Eyes:	Watery and injected.	Pupils contracted.	Normal.
Ears:	Noises in the ears.	Deafness.	Deafness disappears
Temperature:	103° to 106° on 1st day, maximum on 3d or 4th day.	Slight remission from 7th to 10th day. Crisis from 8th to 14th day	Sudden defervescence
Pulse:	100 to 120. First full, then soft.	110 to 140. Weak heart impulse after 6th day.	Declines rapidly.
Respiration, etc:	20 to 30 per minute, catarrhal symptoms.	30 to 40 or 50 per minute. Bronchitis.	Returns to normal.
Cutaneous Surface:	Dry skin. Pungent heat.	"Mouse-like" odor.	Bran-like desquamation. Temporary loss of hair.
Eruption:	"Mulberry rash" on 5th day. On abdomen and extremities	Each spot lasts until recovery or death. Petechiae.	Gradually disappears.
Nervous System:	Frontal headache. Wakefulness. Pain in the thighs. Prostration	Delirium. Deafness. Coma vigil.	Muscular pains. Restful sleep.
Tongue:	First white, then brownish-yellow. Thirst.	Dry, dark, fissured. Tremulous.	Clean and moist.
Intestinal Canal:	Nausea. Constipation.	Constipation. Occasionally slight diarrhoea.	Constipation.
Urine:	Diminished. High colored. Excess of urea.	Transient albuminuria. Retention.	Pale. Increased.
Complications:	Glandular swellings. Cerebral and pulmonary difficulties.		
Duration:	Average duration 13 or 14 days.		
Mortality:	Varies from 6 to 20 per cent.		
Lesions:	No constant post mortem appearances		
Incubation:	Two weeks.		
Contagious Distance:	About two feet.		
Relapses:	Relapses are extremely rare.		
Recurrence:	Typhus occurs only once in a lifetime.		

or ten days, after which it gradually disappears upon the advent of delirium.

Delirium is a common symptom, and appears usually about the eighth day. In rare instances it is present at the onset of the disease, occasionally it remains absent until near the crisis. At whatever period it is developed, it will remain until after the time of critical defervescence. The character of the delirium varies greatly. It is generally quiet, and consists of low mutterings or incoherent ramblings; less frequently it is active and noisy, and resembles that of delirium tremens or of the Irish "whisky fever." Active, noisy delirium occurs most frequently amongst the intelligent classes, and in young persons of active brain; the low muttering form is more liable to be present in the aged, and amongst illiterate people. At first the delirium occurs only at intervals, during the night-time; later on it becomes continuous, and is then worse at night.

Nocturnal wakefulness is a prominent and distressing symptom in the early days of the fever. At times there is drowsiness in the day time, with alternate wakefulness and delirium at night. Not infrequently the patient lies for hours, pale and expressionless, and almost pulseless, with the eyes wide open and the skin bathed in a cold perspiration. Though apparently unconscious, he is evidently awake, but absolutely indifferent and insensible to everything that is going on around him. To this condition, which is almost always followed by a fatal termination, the by no means significant term, *coma vigil*, has been applied. At any time, and more especially in the advanced stage of the disease, the occurrence of hysterical manifestations, should make your utterances guarded as to coming nervous symptoms.

As the fever progresses towards a fatal termination, the drowsiness deepens by imperceptible gradations, first into stupor and then into profound coma. Occasionally coma develops suddenly, and is then apt to be associated with albuminous urine.

Loss of muscular strength is a prominent and early symptom of typhus. In the majority of cases the patient is compelled to take to the bed, on account of weakness, from the first day of the fever. Not infrequently the debility becomes so extreme, that the patient is unable to rise, or to even turn in bed. The prostration generally increases as the disease advances, and is often complete about the ninth or twelfth day. The position of

the patient in bed, is usually on the back; with the increasing prostration there is almost always a tendency to sliding down in bed.

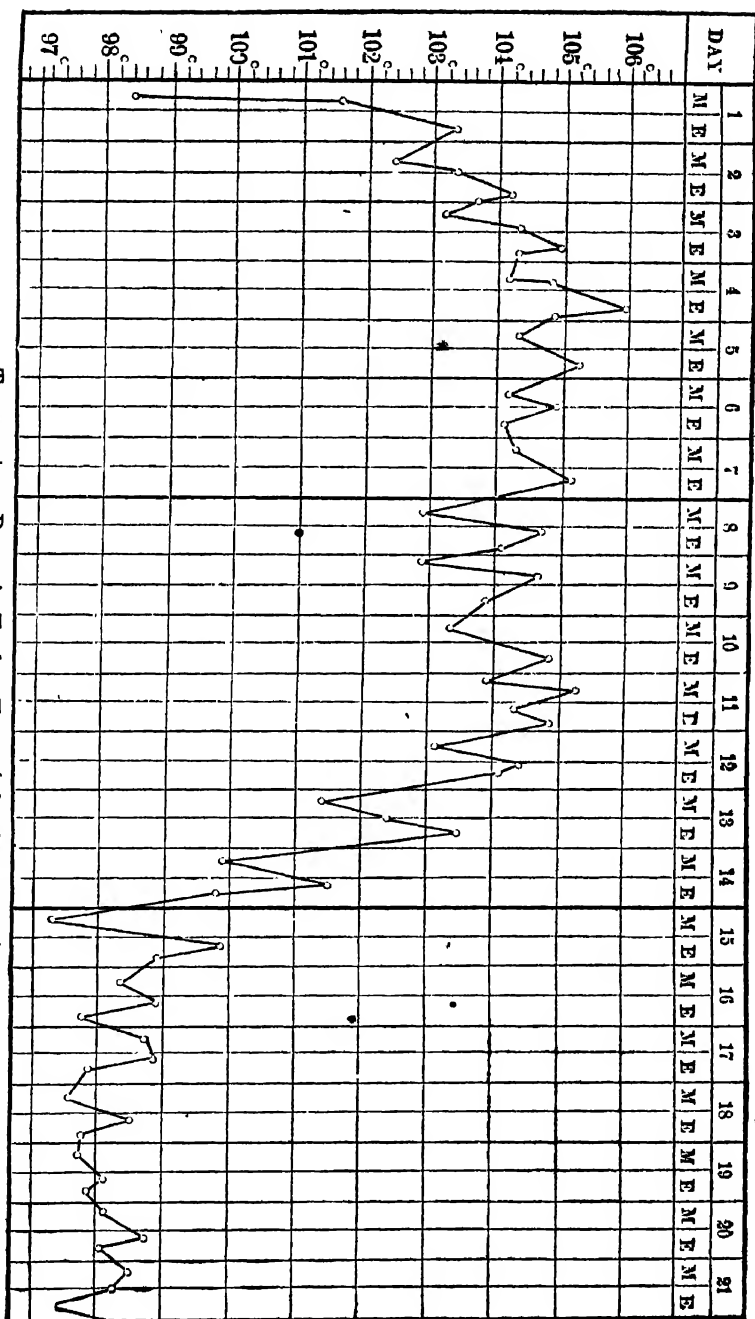
Along with the marked and steadily increasing debility, there is apt to be *paralysis* of the muscles of the rectum and bladder. The urine and fæces may be passed involuntarily, in consequence of paralysis of the anal and vesical sphincters. Sometimes the urine is retained, and there is over-distension of the bladder in consequence of paralysis of the muscular coat. Tremulousness affecting more especially the hands and tongue, is almost constantly observed in severe cases. General muscular tremors occur in the aged and infirm, and in those who have been addicted to the too free use of intoxicating drinks. Ataxic symptoms, such as subsultus tendinum, spasmodic twitchings of the facial muscles, carphologia, and picking at the bed-clothes, are present to a greater or less degree in all severe cases. Nystagmus and obstinate hiccough occasionally occur. Tense contractions of the flexor muscles of the forearm, thighs and legs, are very rare, and occur only in grave cases.

General convulsions are not often met with; but if they do appear, which is generally towards the end of the second week, life is seldom prolonged beyond three or four days. They are usually preceded by a tendency to stupor or to coma, and by a marked diminution in the quantity of urine, and are, as a rule, caused by uræmia.

The Special Senses.—In the early days of the fever, the eyes are watery, the conjunctivæ are deeply injected, and the pupils are *contracted*. Hardness of hearing, preceded by ringing noises in the ears, is very common after the middle of the first week, and frequently extends into convalescence. Cutaneous hyperæsthesia is a not uncommon symptom during the first week.

The Temperature.—The temperature range in typhus fever (fig. 15), is shorter and rises more rapidly to the maximum, than does that of typhoid fever. The fever increases rapidly from the onset of the disease, and the temperature observes very nearly the following *formula of ascent*:

It reaches 103° Fahr. or 105° Fahr. on the first evening; on the next morning it recedes to between 98½° Fahr. and 103° Fahr.; on the second evening it rises up to or above 104.5° Fahr.;



Temperature Range in Typhus Fever (after Murchison).

on the third evening it often reaches 105° Fahr. or 106.5° Fahr., exceptionally it does not rise above 102° Fahr.; and on the fourth evening it is rarely under 105.8° Fahr. and not infrequently it attains 107° Fahr. In children it may not at any time exceed 103° Fahr.

In *mild* or *moderate* cases, the maximum is reached on the fourth day, and at the close of the week there is a slight decrease of temperature. On the seventh or eighth day, there is a more marked remission, followed on the ninth day, seldom later, by a rise of from 0.5° Fahr. to 3.5° Fahr., which lasts from one to three days, and then slowly subsides. A third remission, occupying a half day or two mornings, occurs about the twelfth day, and is followed by a third brief rise, which terminates in defervescence.

In *severe* and *neglected* cases, the temperature continues to rise through the first week until it reaches 106° Fahr. or 107° Fahr. It remains persistent at 104° Fahr. in the morning, and at 105° Fahr. or 106° Fahr. in the evening, through the whole or a part of the second week. Cases which tend to recovery show a slight declination towards the end of the second week, and yet the high temperature continues during the third week. In these severe forms, the temperature range differs from that of typhoid fever in that the daily maxima are higher, and there is less tendency to remissions.

The stage of *defervescence* in typhus occupies from twelve hours to two or three days, and is usually very characteristic. It is generally preceded by a short critical perturbation, a rise of from 0.2° Fahr. to 3.5° Fahr. above the preceding evening, and follows it in a precipitous or progressive descent. Occasionally there is no change in the temperature before the time of crisis, and when this is the case, the defervescence is very gradual. The critical defervescence usually appears between the thirteenth and seventeenth days, and the temperature sometimes falls in a single night from 104° Fahr. or higher to the normal. Recovery generally takes place after the crisis. During the first week of convalescence, the temperature often remains below the normal, especially in the morning.

A very high range of temperature during the first week indicates severe cerebral symptoms during the second week.

The absence of a slight remission about the seventh or eighth day is an unfavorable omen.

A sudden rise during the first week indicates the occurrence of complications.

Fatal cases announce themselves at the outset, by an enormous height of temperature, 106° Fahr., or more.

Just before death and in the death agony, the temperature rises from 2° Fahr. to 6.5° Fahr.

The Pulse.—In the beginning of an attack the pulse is usually full, soft and compressible. As the disease progresses it diminishes in force and rises in frequency. It ranges from 110 to 130 beats per minute. On the third day, in mild cases, it seldom exceeds 100, while in severe cases it may reach 120 or 130. In unfavorable cases it may run up to 140 or even 150 per minute. A pulse which remains for three consecutive days, above 120 per minute, is a bad omen. During the first week, the pulse-rate and the temperature-range, usually correspond, but after this time the parallelism ceases. During the second week, especially if the debility is very great, the pulse may become more rapid as the temperature falls; or the pulse may at other times diminish in frequency, and yet the temperature rise. A rapid fall in the pulse rate during defervescence is usually a favorable indication. A decided rise after it has fallen is frequently indicative of pulmonary complications.

The heart impulse is almost invariably enfeebled, after the fifth or sixth day of the fever, and the cardiac first sound is occasionally replaced by a soft systolic murmur. As convalescence becomes established both the impulse and the first sound slowly return to normal.

The Eruption.—The eruption of typhus fever, which is very rarely absent, appears, as a rule, on the fourth or fifth day. It is preceded and accompanied by an erythematous redness of the whole surface, and is first seen upon the sides of the chest and abdomen. It consists of a mottling or marbling of the skin, described as the *sub-cuticular rash*, and of pale, dirty pink, or florid spots, slightly raised above the surface, disappearing on pressure, and presenting by their grouping, a close resemblance to measles. After two or three days they are no longer elevated and distinct, but frequently appear as illy-defined rust-colored

stains, which are but slightly influenced by pressure. The subcuticular mottlings gradually disappear as the spots grow darker. The latter are generally darker and more distinct on the dependent portions of the body. The extent and lividity of the eruption are, usually, proportionate to the severity of the attack.

During the second week, the centers of some of the pigmented spots, become the sites of minute extravasations of blood. In some cases true petechiæ appear; they are, however, seldom present before the last stages. After death the petechiæ and the rusty stains remain persistent, but the pinkish or florid spots usually disappear.

The duration of the rash, which generally disappears with defervescence, is from eight to twelve days.

Minute transparent vesicles, called sudamina, have been observed in a limited number of cases, at a late period of the disease. Urticaria, herpes and erysipelas, exceptionally occur. Changes in the nails, as shown by white bands and furrows, indicating arrest of nutrition during the fever, not infrequently take place. Slight, bran-like desquamation, proceeding from above downward, occasionally occurs, during convalescence.

Emaciation is seldom marked, and is rarely present before the third week.

The ammoniacal or "mouse-like" odor, which emanates from typhus patients is said to be characteristic.

The Respiratory System.—During the first week the respirations rarely exceed twenty or thirty per minute. But during the second week, with the advent of delirium, they become hurried, and range from forty to fifty per minute. In grave cases, when the prostration is extreme, and the stupor becomes profound, they are irregular and sometimes fall to eight or ten per minute.

Nasal and bronchial catarrh attended with slight cough, is usually present during the first week. Diffuse bronchitis, hypostatic congestion of the lungs, or lobular pneumonia may appear during the second week. Diphtheritic croup has been observed in some epidemics.

The Digestive System.—The changes in the digestive tract are mainly functional in character. *Nausea* and *vomiting* are rare. Vomiting occurs as an early symptom, principally in dyspeptic individuals, occurring after the first week, it is occasionally the precursor of uræmic convulsions and coma.

At first the *tongue* is covered with a whitish or yellowish-white fur. Towards the end of the first week, it becomes dry and brown and is protruded tremulously. Not unfrequently, in severe cases, it becomes dry and crusted, and is firmly retracted into a globular mass. In grave cases, about the beginning of the second week, sordes collect upon the gums, teeth and lips.

Thirst and *anorexia* are constant symptoms. The former is most marked during the first but diminishes during the second week. The latter is complete throughout the attack, but disappears, often suddenly, during the sleep that marks the crisis.

Constipation is the rule. A mild, dark, greenish-brown diarrhea sometimes occurs at the period of critical defervescence. Involuntary discharges occur only in severe cases, and generally upon the approach of death. *Acute enlargement of the spleen* is frequently present.

The Urine.—At first the urine is diminished in quantity, and is high-colored and of high specific gravity. It is acid in reaction, and contains more urea and less chlorides. A small amount of albumen is frequently present early in the attack, and in severe cases it may be copious and persistent. Renal epithelium, and epithelial and fatty casts are not uncommon. Later in the disease the urine may become suppressed, and urinary retention may render the use of the catheter necessary.

As convalescence approaches it becomes pale and increased in quantity. The chlorides reappear, the amount of urea lessens, and the albumen gradually disappears.

Morbid Anatomy.—Typhus fever has no known special and characteristic lesion. Morbid appearances in different organs are frequently found after death, but they are due to the prolonged, intense pyrexia, or to complications.

The *body* is seldom very much emaciated, unless death has taken place after the second week. Cadaveric rigidity is usually of short duration; and decomposition takes place rapidly.

The *blood* is darker than normal. When drawn from the body it coagulates imperfectly and rapidly undergoes ammoniacal decomposition. The fibrin is diminished, while urea and ammonia are in excess. The red globules become diminished in quantity, and when examined under the microscope, many of them pre-

sent serrated edges, and some are found to have undergone degeneration.

The *heart* undergoes granular degenerative changes, proportionate to the intensity and duration of the febrile movement. It is soft and flaccid; the muscular tissue is of a yellowish-brown color, and easily torn. The feebleness of heart-impulse is proportionate to the degree of degeneration found after death. Thrombi are often discovered in the superficial veins of the lower limbs. They are usually formed by a slowing of the general circulation, consequent upon the great feebleness of heart power, and are apt to cause swelling of one or both extremities.

The *kidneys* are commonly hyperæmic, and are apt to be enlarged in consequence of a cloudy swelling of the epithelium of the renal tubes.

The *liver* and *spleen*, are, as a rule, enlarged. The former is hyperæmic during the first, and more or less fatty and friable during the second week. The latter undergoes softening, early in the disease, even during the first week, and interstitial extravasations of blood, not infrequently occur.

The *respiratory tract* exhibits signs of catarrhal inflammation of the bronchial tubes. Patches of atelectasis are often found as a result of capillary bronchitis. Evidences of hypostatic congestion, of catarrhal pneumonia, of pulmonary oedema or of pulmonary gangrene, are also frequently observed.

The *brain*, as a rule, presents some changes. The cerebral vessels will be found to be intensely congested, or else an abundant, usually clear, fluid effusion, varying in quantity from one to eight ounces, will be observed underneath the arachnoid and in the ventricular cavities.

Enlargement of the sub-lingual and parotid glands, is a not infrequent autopsic phenomenon.

LECTURE XIX.

Typhus Fever (CONTINUED.)

I will direct your attention to-day to the differential diagnosis and treatment of typhus fever.

Differential Diagnosis.—The diagnosis of this disease cannot be definitely determined before the appearance of the eruption. During the prevalence of an epidemic, the sudden onset of fever, after a short, sharp, sudden chill, with a rapid rise in temperature, dull, heavy, steadily increasing frontal headache, pain in the back and limbs, and early and extreme prostration are markedly suggestive typhus symptoms. The “mulberry rash” on the fifth or sixth day, and the critical defervescence about the fourteenth day are characteristic.

The diseases with which it is most liable to be confounded are, typhoid fever, relapsing fever, cerebro-spinal fever, measles, pneumonia, acute Bright’s disease, delirium tremens, remittent fever, pyæmia and the plague.

The rules for differentiating *typhoid fever* and *relapsing fever* (p. 166), and *cerebro-spinal fever* (p. 236), I have already given you in the lectures upon those diseases.

Measles as distinguished from typhus fever, in children, is characterized by the coryza and cough of the pre-eruptive stage, by the intensely injected pharyngeal mucous membrane, by the brighter tint of the eruption, by the presence of the eruption upon the face, and by the absence of nervous symptoms such as delirium, prostration and a tendency to coma.

Pneumonia, with typhoid symptoms, is sometimes mistaken for typhus fever. If there is no eruption present, the appear-

hance of the physical signs of pulmonic consolidation, is suggestive of pneumonia; for pulmonary consolidation as a complication of typhus is not developed until after the sixth day of the fever, at which time the eruption is generally visible.

Acute Bright's disease, which at times closely resembles typhus fever, may be differentiated by the lower temperature range, by the presence of œdema, and by the absence of the typhus rash.

Delirium tremens, occasionally, closely resembles typhus. It differs however, in that it is generally marked by a lower range of temperature—seldom above 100° Fahr.—and by the absence of eruption. As a rule it is ushered in by insomnia instead of headache, and under circumstances which establish beyond a doubt the nature of the attack.

Remittent fever, especially that malignant form which prevails in tropical countries, is attended by many symptoms of typhus. It, however, lacks the eruption of typhus, and is apt to be associated with other malarial types of disease. It is always attended by a greater enlargement of the spleen.

Pyæmia, *septicæmia* and *erysipelas* are often attended by many of the ushering-in symptoms of typhus, and when the latter is epidemic, it will be frequently impossible to make a differential diagnosis until after the time for the typhus eruption.

The plague resembles typhus in that it is highly contagious, and is attended with marked cerebral and petechial symptoms. It, however, differs from it by running a shorter course, and by being attended by nausea, vomiting and swelling of the *inguinal* and axillary glands.

Prognosis.—The prognosis is always grave. It is, as a rule, more favorable in childhood and youth than in old age. It is particularly unfavorable in intemperate persons, and in individuals of a gouty diathesis.

The ratio of mortality varies from six to fifteen or twenty per cent.

Severe headache, early and extreme prostration, a *presentiment of death*, long-continued high temperature, constant delirium, profound stupor, "pin-hole pupil," "*coma vigil*," subsultus tendinum, carphologia, a *copious eruption* and a feeble heart impulse, are important danger symptoms. The danger is gen-

erally proportionate to the copiousness of the eruption, and to the severity and early appearance of the cerebral symptoms.

The first indication of recovery, which usually appears between the tenth and the fourteenth days, is a diminution in the frequency of the pulse, accompanied by a fall of two or three degrees in the temperature.

Death commonly occurs about the crisis, but may take place at any period. It may occur by either asthenia or coma, but is generally due to complications.

Treatment.—*Prophylaxis.*—Typhus fever is, in this country, almost exclusively, an imported disease. And its epidemics can, in the majority of cases, be traced directly to the introduction of the disease through infected Irish emigrants who land in New York and other large cities. Hence the responsibility of its occurrence and spread, rests entirely with the national authorities. Much can, however, be done to prevent its spread after it is imported, and, as guardians of the public health, this will be a part of your duty.

Upon an outbreak of an epidemic of typhus, the strictest sanitary measures should be observed, and more especially in localities where there is over-crowding, destitution and want. The first cases of the fever should be isolated in hospitals, and the dwellings in which it has broken out should be depopulated and thoroughly disinfected for one or two days, before the rooms are again inhabited. All *typhus localities should be immediately quarantined.*

There is no known *prophylactic treatment* for typhus, other than *isolation, free ventilation, and thorough disinfection* of everything contaminated by contagion. Fresh air is absolutely necessary. All the windows in the sick room should be kept open, regardless of the cold, and if necessary, the patients may be covered with blankets to keep them warm. In hospital practice it has been found that patients do better in open tents, than when breathing the confined air of hospital wards. Cleanliness is of the utmost importance; all the excretions should be promptly and thoroughly disinfected with Platt's chlorides, or a solution of carbolic acid.

During typhus epidemics you should never visit a typhus patient until after eating, and before the system has become fatigued by the worry and care of the day's business. Always

make your visits short, avoid inhaling the exhalations from the patient's body, and remember that the contagious distance is about two feet.

After recovery or death, all articles worn by the patient, the room and all its contents should be thoroughly disinfected by the burning of sulphur or the pouring of crude carbolic acid on chloride of lime. The bed and body linen, and all blankets and flannels that have been about the bed, should, after exposure to the disinfecting gases, or immersion in some disinfecting fluid, be thoroughly *boiled* or *baked*. Carpets, if they have been permitted in the sick room, should be taken up and fumigated, and afterwards beaten or shaken, and exposed to the wind and sunshine in the open air for several days. The mattress and pillows should be burned. After everything has been disinfected, the wood-work of the infected building should be thoroughly cleaned with carbolized water (one part of acid to forty or sixty of water), the walls whitewashed, and the rooms freely aired for at least one week.

Principal Remedies.—*Gelsemium* is indicated when the fever sets in suddenly, after over mental exertion, and when there is great prostration of all the vital forces. *Baptisia* will be of service early in the disease, when there is intense headache, with extreme depression of vitality, and despair of cure. *Bryonia* is called for during the first week, when there is a dry cough, with throbbing or darting, tearing pains in the head, aggravated by motion, or with mild delirium about business affairs.

Belladonna when there is great cerebral congestion with throbbing of the carotids, or furious delirium. *Hyoscyamus* when the cerebral symptoms are more adynamic, and the patient sinks into a state of apathy and stupefaction. It is one of the best remedies, when the pains in the head are very severe, or when with the delirium there is a constant desire to escape. Also if there is a good deal of mucous rale. *Stramonium* will be of service when the delirium is so excessive as to threaten exhaustion. *Agaricus* is called for when ataxic symptoms are present, and when with tremor and restlessness there is a constant desire to get out of bed. *Phosphoric acid* when there is great nervous depression with slight febrile excitement. *Opium* if wild delirium alternates with stupor and stertorous breathing, or if sopor

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threatens to terminate in paralysis of the brain. *Arnica* if stupefaction is attended with involuntary discharge of stool and urine. *Rhus tox.* for involuntary foetid evacuations, with an accumulation of blackish-brown mucus on the tongue. *Arsenicum alb.* for uræmic convulsions, and when with involuntary diarrhea there are a sunken countenance and a dry, cracked tongue. *Opium* for uræmic coma, and for urinary retention. *Muriatic acid* in advanced stages, when there is complete loss of muscular power, and low delirium; the patient is so weak he settles down in bed.

Merc. bi-jod. is the remedy for inflammatory swelling of the salivary glands and areolar tissue about the neck. *Senega* or *tart. emet.*, for the bronchitis. *Phosphorus* for lung complications and when there is extreme nervous depression. If gangrene threatens, either *arsenicum* or *carbo. veg.* will be needed. And when there is sudden sinking of the vital forces, with apathy, muttering delirium, and an intermittent pulse, *veratrum alb.* may do you excellent service.

Leading Indications.—The guiding symptoms for these and other remedies of use in typhus, may be compiled as follows:

Aconite.—Great fear of death; he predicts the day he will die (*ars.*). Sensation of emptiness in the head (*cocculus*). Fullness and heaviness in the forehead, as if the brain would start out of the eyes (*bell.*, *bry.*). Burning headache, as if the brain were moved by boiling water. Active inflammatory symptoms. In sanguine and plethoric individuals.

Agaricus musc.—Disinclination to answer questions (*phos. acid*). Desire for alcoholic drinks. Sensitive smell (*colch.*). Dry tongue with dryness and constriction in the fauces. Rumbling in the bowels with the passage of much inodorous flatus. Delirium with constant raving, tries to get out of bed (*hyos.*). Contracted pupils; dry, tremulous tongue. Frequent pulse, with weakness of the first sound of the heart. Trembling of the hands. Pains in the legs, especially in the hip joints. Twitchings of the gluteal muscles. Cramps of the hands and feet.

Apis mel.—Stupor with muttering delirium. Sopor, interrupted by piercing shrieks. Tongue swollen, dry, cracked, ulcerated and protruded with difficulty (*ars.*, *rhus*). Great soreness in the pit of the stomach when touched (*bry.*). Soreness

and bloatedness of the abdomen (*lach.*). Frequent, foul, involuntary stools. Suppression of urine (*hyos., opium*). White miliarial eruption on the chest and abdomen. Great weakness and sliding down in bed (*mur. acid*). Carbuncles with burning, stinging pains (*ars.*). Accumulation of tough mucus in the throat.

Arnica.—Stupefaction with foetid breath, and large, yellowish-green spots on the skin. Great weariness compelling the patient to lie down, and yet he asserts that he feels perfectly well (*ars.*). Forgets the words while speaking (*rhus*). Declines to answer questions (*phos. acid*). Confused feeling in the head with pressure over the right brow. Unrefreshing sleep with anxious dreams. Muttering and loud blowing during expiration. Desires to be constantly moved, the bed feels too hard (*bapt.*). Dryness of the lips and tongue. Trembling of the lower lip. Brown streak through the center of the tongue (*bapt.*). Involuntary discharge of urine and fæces (*ars., hyos.*). Petechiæ. Ecchymoses.

Arsenicum alb.—Great restlessness and anxiety. Predicts the day he will die (*aconite*). Constant motion of the head and limbs. Death-like color of the face (*carbo. veg.*). Sunken, hippocratic countenance (*verat. alb.*). Staring, glistening, sunken eyes. Hardness of hearing. Lips dry, cracked and covered with sordes. Tongue red, dry and cracked (*bry., rhus*). Black, leather-like tongue. Dryness of the mouth with violent thirst; drinks often, but little at a time (*bell., cinch., opp. bry.*). Unintelligible articulation, as if the tongue was too heavy (*carbo. veg.*). Intense burning pains in the stomach and pit of the stomach (*phos., verat. alb.*). Violent and incessant vomiting. Involuntary micturition (*hyos.*). Weak, tremulous, hoarse voice. Short, anxious, rattling breathing, with great anguish. Very tenacious mucus in the chest (*kali bich., tart. emet.*). Extensive pulmonary hypostasis. Pulse frequent, hard and tense, or small, trembling and intermittent. Irregular action of the heart, absence of the second sound. White miliarial eruption (*lach., mur. acid*). Petechiæ (*rhus, secale, arn.*). Boils (*merc., sil., sul.*). Carbuncles, which burn like fire (*caust., merc., sil.*). Rapid prostration of strength (*aconite, verat. alb.*).

Arum triph.—Soreness of the lips and corners of the mouth.

Swelling of the sub-maxillary glands and neck (*merc. bi-jod.*). Sore, red tongue with elevated papillæ. Foetid breath. Boring of the nose; picking the ends of the fingers. Symptoms of uræmic poisoning (*ars., opium*).

Baptisia.—Confusion of ideas (*gels., rhus*). Great nervous restlessness, especially at night. Dull, stupefying headache (*gels.*). Head feels as if scattered about; tries to get the pieces together (*stram.*). Falls asleep in the midst of attempted answers (*arn., hyos.*). Dark, red face, with besotted expression. Numbness of the head and face. Tongue coated brown, and dry, particularly in the center. Feeling as if the lower limbs were severed from the body (*opium*). Sensation as of a second self alongside in bed. The hands feel too large. Soreness of the flesh, the bed on which he lies feels too hard (*arn., rhus*). Offensive secretions.

Belladonna.—Starting, jumping during sleep. Sleepiness, with inability to sleep (*lach., opium*). Violent delirium. Constant desire to spring out of bed (*agar., hyos.*). Attempts to bite, strike and spit at attendants (*hyos., opium*). Violent throbbing in the brain. Throbbing of the carotids (*glon.*), and great intolerance of light and noise (*aco., opium*). Pressive pain in the forehead, as from a heavy weight, obliging him to close the eyes (*puls.*). Sparkling, staring eyes (*hyos., stram.*). Dilated pupils (*gels.*). Humming, roaring and tingling in the ears. Glowing redness of the face, or else great paleness (*bry.*). Dryness of the mouth, tongue and throat. Tongue red at the edges and white in the center (*gels.*). Trembling and heaviness of the tongue with stammering speech (*lach.*). Difficult deglutition; fluids swallowed, return through the nose (*kali bich., lach.*). Involuntary micturition and defecation. Tendency to slide down to the foot of the bed (*mur. acid.*). Dry, spasmodic cough, worse at night (*dros., hyos.*). Jerking of the bedclothes. Starts as if in affright on awaking or during sleep (*ars.*).

Bryonia.—Exceedingly irritable, everything makes him angry (*cham.*) Nightly delirium, especially about the affairs of the previous day, or business matters. Desire to escape from bed and go home. Vertigo with sensation as of the head turning in a circle (*bell.*). Visions when closing the eyes. Buzzing in the ears with hardness of hearing. Red, bloated, hot face. Dry,

parched and cracked lips. Tongue dry, rough and cracked, often of a dark-brown color. White or yellow coating on tongue. Excessive thirst, drinks large quantities at a time and at long intervals. Nausea and faintness on rising. Stitches in the liver and spleen (*merc.*). Constipation. Cough, with stitches in the chest, and expectoration of tenacious, rust-colored sputa (*phos., rhus*). Typhoid pneumonia. Restless sleep with moaning and with chewing motions (*hell.*). Great weakness and exhaustion.

Camphor.—Sudden and great sinking of strength (*ars.*). Extreme restlessness and anxiety (*ars*). Cold sweat all over the body (*verat. alb.*). Cold, pointed nose. Face, pale and anxious. Sudden sinking spells. Small, weak, scarcely perceptible pulse (*carbo. veg.*). Violent delirium. Great thirst; coldness of the tongue (*carbo. veg., verat. alb.*). Rattling in the throat, involuntary evacuations.

Carbo. veg.—Restlessness and anxiety. Greenish color, or great paleness of the face (*ars*). Hippocratic countenance (*verat. alb.*). Coldness of the breath and tongue, at times the tongue is moist and sticky; at others it is dry and cracked. Hawking of mucus in the throat. Internal burning, wants to be fanned (*ars.*). Loud, rattling breathing. Cough, with greenish, foetid expectoration (*sil*). Paralysis of the lungs with blueness of the face, lips and tongue. Thread-like, scarcely perceptible pulse. Ecchymoses.

Cinchona.—Sense of internal illness, as of impending disease. Pressure in the head from within outwards, as if it would burst, relieved by hard pressure. Whizzing in the ears, with hardness of hearing (*phos., rhus*). Bitter taste in the mouth; obstinate constipation. Empty eructations; milk deranges the stomach (*sulph*). Enlargement of the liver and spleen. Profuse sweat during sleep, especially on the side on which the patient lies. Great weakness. Protracted convalescence.

Cocculus.—Slowness of comprehension. Vertigo with nausea when rising up in bed (*bry*); must lie down. Heaviness of the lids, with unconquerable sleepiness. Drowsiness lapsing into coma. Stupor; coma vigil. Noise in the ears like the rushing of waters. Tremulousness; automatic motions. Weakness of the cervical muscles. Drink rolls audibly down the throat into

the stomach (*laur., hydr. acid.*). Great general weakness and weariness after over-exertion (*agaricus*).

Gelsemium.—Dullness of the mental faculties (*bapt.*). Drowsiness, vertigo, and great muscular prostration. Heaviness of the head, relieved after profuse emission of watery urine (*phos. acid.*). Vertigo and blurred vision (*iris vers.*). The brain feels as if bruised (*bell.*). Head feels as "big as a bushel." Cephalalgia with lancinating pains extending from the left occipital region through the head to the forehead and eyeballs. Pain as from a tape around the head (*merc.*). Drooping of the eyelids (*rhus*). Great aversion to light, with dilatation of the pupils (*bell.*). Heavy, besotted expression (*bapt.*). Crimson flush of the face. Tongue coated yellowish-white, with foetid breath. The tongue trembles so he can hardly protrude it (*bell., lach., secale*). Predominance of nervous symptoms (*phos.*). Complete prostration of the whole nervous system (*cimicifuga*).

Helleborus nig.—Sensation of soreness in the back of the head with stupefaction. Eyes vacant, pupils dilated (*bell., hyos.*). Insensibility. Chewing motions of the jaws (*bry.*). Convulsive twitchings of the muscles (*cupr.*). Constant picking of the lips and bedclothes. Sliding down in bed (*mur. acid.*). Small, slow, tremulous pulse. Suppression of urine, or highly albuminous urine. Trifling loss of flesh.

Hyoscyamus.—Complete loss of consciousness (*bell., opium*). Muttering with picking at the bedclothes (*opium*). Muttering loquacity (*apis*). Answers questions correctly, when asked, but lapses again into delirium (*arnica, bell.*). Whines and don't know why. Coma vigil. Delirium continues while awake; sees persons who are not, and who were not present. Jumping out of bed. Thinks he is in the wrong place. Attempts to run away. Desires to uncover and remain naked. Flushed face, stupid expression (*bapt.*). Red, sparkling, staring eyes (*bell.*). Objects appear too large or red as fire (opp. *plat.*). Pupils dilated (*bell., opp. phos.*) and insensible (*opium*). Constrictive sensations in the throat with inability to swallow (*bell., stram.*). Clean, parched, dry tongue. Hiccough; putrid breath. Involuntary stools at night (*ars., rhus*). Retention of urine (*opium*). Involuntary urination. Grating of the teeth (*apis, hell.*). Trembling of the limbs. Subsultus tendinum. Hyperæsthesia

of the skin. Brown spots, or gangrenous vesicles on the body. Great nervous excitability without much cerebral hyperæmia.

Lachesis.—Great mental and physical exhaustion. Sleepiness, with inability to sleep. Aggravation of all the symptoms after sleep. Headache, mostly in the forehead with nausea and chilliness (*puls.*). Loquacious, constantly changing from one subject to another. Stupor and muttering delirium (*apis*). Sunken countenance. Dropping of the lower jaw (*lycop.*, *opium*). Dry, red or black, cracked and bleeding tongue (*ars.*). Trembling of the tongue when protruding it (*bell.*, *gels.*). In putting the tongue out it catches on the teeth or under lip. Dry, cracked and bleeding lips. Variable appetite. Desire for oysters (*lyc.*). Hyperæsthesia of the abdomen. Alternate diarrhea and constipation. Dyspnoea. Hawking of mucus with rawness in the throat. Burning in the chest (*opp. ars.*). Irregularity of heart-beat (*digit.*). Carbuncles surrounded by small boils and purple spots. Falling off of the hair (*merc.*, *phos.*). In intemperate persons.

Lycopodium.—Depression of spirits (*nat.*, *puls.*). Afraid of being alone (*ars.*, *opp. nux*). Uses wrong words to express an idea (*arn.*, *anac.*, *graph.*). Restless sleep. Pressing headache on the vertex, worse from lying down. Tearing pain in the occiput (*con.*). Putrid smell from the mouth. Roaring, humming and whizzing in the ears (*cinch.*). Tongue coated white, or else red and dry. Vesicles on the tongue. The tongue is thrust spasmodically to and fro between the teeth. Dropping of the lower jaw (*lach.*, *mur. acid.*, *opium*). Fan-like motion of the alæ nasi. Desire for sweet things. A little food seems to fill the stomach full, and causes fullness and distension of the abdomen. The urine leaves a red, sandy stain on the sheet (*cinch.*, *phos.*). Chilliness in the rectum before stool. Scanty stool with a sensation as if much remained behind. The hair becomes gray early. Falling out of the hair (*graph.*, *merc.*, *phos.*).

Mercurius.—Great restlessness, weariness and prostration. Heaviness of the head with great inclination to sleep. Swollen, soft, flabby tongue. taking the imprints of the teeth. Putrid odor from the mouth. The tongue is coated with a dirty-yellow fur; feels as if burnt (*colocynth*). Region of the liver painful and sensitive to contact (*bell.*, *bry.*). Swelling and suppuration

of the inguinal glands (*nit. acid*). Frequent urination; the urine leaves a whitish sediment. Icteroid hue of the skin. Sudamina.

Muriatic acid.—When decomposition of the fluids is slow and extensive. Continuous delirium; vivid hallucinations. The patient is busied with past and present events. Sleepiness in the daytime, sleeplessness at night with muttering delirium. Constant inclination to slide down in bed. Glistening eyes; contracted pupils. Acuteness of the special senses. Excessive dryness of the lips, mouth and tongue. Tongue heavy, like lead, preventing talking. The lower jaw hangs down (*lach.*, *lycop.*, *opium*). Involuntary micturition and defecation. Pulse rapid and very feeble, intermits every third beat (*nit. acid*). Accelerated breathing. Great prostration.

Nux vom.—Over-sensitiveness to external impressions (*cinch.*). Delirious phantasies only on lying down. Chilliness on slight movement. Dryness of the mouth and tip of the tongue. Hunger with aversion to food (*opium*). Flatulent distension of the abdomen after eating (*cinch.*, *lycop.*). Alternate constipation and diarrhea. Throbbing in the region of the liver (*bry.*). Numbness and deadness of the lower limbs. Heaviness of the body (*opp. sepia*). In thin, slender persons.

Opium.—Drowsiness or sopor. Complete loss of consciousness (*hyos.*) with slow stertorous breathing. Symptoms resembling delirium tremens. Stupid sleeplessness with frightful visions. Suffocating nightmare. Muttering delirium. Attempts to escape (*bell.*, *hyos.*). Contracted pupils (*hyos.*, *physostigma*). Glassy, half-closed eyes. Face dark-red, bloated, hot (*bell.*) flushed (*hyos.*), or pale and sunken. Bed feels hot, can hardly lie on it. Difficult, intermitting breathing, as from paralysis of the lungs (*lyc.*, *tart. emet.*). Deep snoring, slow breathing with open mouth. Convulsive movements and numbness of the limbs. Retention of urine. Involuntary stools. Picking at the bed-clothes (*hyos.*). Dropping of the lower jaw (*lach.*, *mur. acid*). In children and old people.

Phosphorus.—Constant sleepiness. Low muttering delirium (*arn.*, *bapt.*, *rhus*). Coma vigil. Inability to concentrate thought (*arn.*, *rhus*). Carphologia (*arn.*, *hyos.*). Contracted pupils (*opium*, *physostigma*). Humming and roaring in the head.

Throbbing in the ears (*calc*), loud whizzing before the ears (*merc.*). Dullness of hearing, particularly of the human voice. Pale, sallow complexion. Dry, immovable tongue, cracked and covered with sordes (*ars.*, *verat. alb.*). Thirst with desire for very cold drinks (*rhus*). Region of stomach painful to touch. Feeling of coldness in the abdomen (*ars.*, *sepiä*). Brown urine, depositing a brick-dust sediment (*cinch.*, *lyc.*). Hard, dry cough with oppression of the chest. Loud mucous rales in the lower lobes (*ipecac.*, *tart. emet.*). Hepatization of the lungs. Small, quick, easily compressed pulse. Heaviness of the lower limbs. Ecchymoses.

Phosphoric acid.—Perfect indifference (*cinch.*, *lyc.*). Disinclination to talk (*bell.*, *phos.*, opp. *stram.*). Incapacity for thought (*gels.*). Answers questions slowly and reluctantly or short and incorrectly (*phos.*). Somnolence with muttering delirium. Headache, worse from the least shaking or noise (*bell.*, *kali bich*). Deafness with roaring in the ears. Dryness of the tongue and throat without thirst (*nux*). Desire for refreshing or juicy things (*puls.*, *verat. alb.*). Feeling of heaviness in the region of the liver. Involuntary stools. Frequent emission of pale, watery urine, forming a milky-white cloud, especially at night. Frequent, small, feeble pulse. Cough with purulent, offensive expectoration (*ars.*, *sulph.*). Bluish-red spots on the parts upon which the patient lies. Profuse night (*merc.*) and morning (*cinch.*) sweats. In young persons who have grown very rapidly.

Rhus tox.—Great restlessness and uneasiness (*ars.*). Incoherent muttering. Answers questions correctly but slowly (*bry.*, *hepar*). Desire to commit suicide (*hepar*, *nux*). Active delirium and great prostration. Vivid, troublesome dreams of excessive bodily exertion. Fullness and heaviness in the forehead, worse from opening or moving the eyes (*puls.*). Dark, livid redness of the cheeks. Dry, red, cracked tongue (*bapt.*, *bell.*). Redness of the tip of the tongue in the shape of a triangle. Putrid taste and breath. Induration of the parotid and submaxillary glands. Great thirst for cold drinks (*phos.*) especially cold milk. Involuntary fetid stools during sleep. Dry, tickling cough, worse in the evening and before midnight. Infiltration of the lower lobes of the lungs. Erysipelas with great burning. Glandular swellings.

Secale corn.—Constant sighing. Great prostration and extreme restlessness. Mania with inclination to bite (*bell., stram.*). Aversion to being covered. Anxiety and burning at the pit of the stomach (*ars.*). Fear of death (*ars.*). Cold perspiration on the face and forehead. Brown or blackish tongue (*ars.*). Violent, unquenchable thirst. Hiccough (*ars., nux mos.*). Involuntary diarrhea (*hyos.*). Suppression of urine. Great trembling when attempting to move. Fuzzy feeling in the extremities. Extensive ecchymoses.

Stramonium.—Stupid indifference (*phos. acid.*). Desires light and company (opp. *hyos.*). Loquacious delirium (*luch., lachnanthes*). Furious delirium; strange fancies; and desire to go home (*bry.*). Indomitable rage, and desire to bite (*bell., secale*). Wide open, staring eyes (*bell., hyos.*). Transient loss of sight, hearing and speech. Oblique vision. Violent thirst, especially for sour drinks (*bry., secale*). Yellowish-brown coating on the tongue which is dry in the center (*bapt.*). All food tastes like straw (*sulph.*). Black stools which smell like carrion (*ars., carbo. veg.*). Suppression of urine or else involuntary urination. Constant restlessness with jerking motions of the limbs and of the whole body. Carphologia. Subsultus tendinum.

Sulphuric acid.—Irrascibility. Hardness of hearing (*calc., sulph.*). Dry, red or brown tongue. Aphthæ. Swelling and inflammation of the sub-maxillary glands. Violent hiccough (*secale*). Dark, persistent hemorrhages. Blue, ecchymotic spots (*carbo. veg., phos. acid.*). Great weakness and prostration.

Tartar emet.—Stupefying headache with pressure from without inwards, in the forehead and over the root of the nose. Irresistible inclination to sleep. White, pasty coating on the tongue. Tongue red in streaks and dry in the middle (*rhus*). Continuous anxious nausea (*ipecac*). Violent and painful urging to urinate with scanty or bloody discharge (*can. sat.*). Great rattling of mucus in the chest (*ipecac*). Cough with suffocative attacks. Threatened cedema of the lungs (*moschus*).

Veratrum alb.—Desire to bite, strike or tear things (*bell. stram.*). Coma vigil with frequent starts, as if from fright. Sudden sinking of strength (*ars., camph.*). Hippocratic countenance. Cold perspiration, especially on the forehead. Sunken

eyes; pointed nose. Tongue cold (*carbo. veg.*), or coated white with red tip and edges. Violent thirst for cold water (*ars.*, *phos.*). Spasmodic constriction of the throat (*hyos.*). Suppression of urine. Icy coldness of the hands and feet. Petechiæ on the extremities.

Veratrum vir.—Muttering delirium. Restless sleep, with dreams of being drowned. Headache, the pains begin in the forehead and run back to the occiput and spine. The eyes remain open and the pupils are dilated. The face is flushed, or else pale and covered with cold perspiration. The tongue is coated white or yellow, with a red streak down the center. The pulse is irregular, hard and frequent, and the heart beats rapidly when turning over in bed (*bell.*). Oppression of the chest with slow, labored breathing. Involuntary urination. Hiccough. Subsultus tendinum. Heart failure.

Zincum.—Weakness of memory (*enac.*). Brain exhaustion. Delirium, with attempts to get out of bed (*hyos.*). Constant jerking of the whole body during sleep. Carphologia. Subsultus tendinum. Sliding down in bed (*mur. acid.*). Involuntary evacuations.

HYGIENIC AND DIETETIC TREATMENT.

The sick room should be large and *well ventilated*, for in typhus fever bad air is more to be dreaded than ventilation. *Always allow plenty of fresh air to circulate about the patient, day and night.* For asylums, the hospital tent will always be better than the hospital ward.

Carpets, all unnecessary furniture, and everything that is liable to absorb and retain contagion should be removed from the apartment. The patient should go to bed as soon as the fever appears. All unnecessary visiting should be prohibited. All mental and bodily effort should be avoided. Throughout the whole course of the disease, quietude and the strictest cleanliness should be observed. Platt's chlorides diluted one part to ten, or some other disinfectant, should be sprinkled freely over the bed and on the floor. Cloths wet in the solution should also be suspended in the room. In severe cases, especially after the first week, the patient must not under any circumstances be allowed to assume the erect posture, as fatal syncope might result. To prevent hypostatic pneumonia the nurse should be

instructed to turn the patient upon one side or the other every few hours.

The *dict* consists principally of milk, which may be administered ice cold if desired. After three or four days, to support strength, beef tea, mutton broth, light soups, milk punch, or yolks of eggs beaten up in milk, may be alternated with milk. The patient should be fed—not over-fed—as often as every two hours during the day, and every three hours during the night, except when quietly sleeping. Water may be administered without stint. When food is obstinately refused or cannot be swallowed, life may be sustained by pouring liquid nourishment into the stomach, by means of a long tube passed through the nose, or by rectal alimentation. The hypodermatic method of administering remedies (p. 98) will also be of service in such cases.

Sponging the body every night with warm whisky and water is not only grateful to the patient, but is also useful as a sanitary measure.

Concerning *baths*, which are deemed advisable unless adynamia is present, Loomis, who has had large experience with typhus in this country, writes: “As soon as the temperature of the patient rises to 104° Fahr. he must be placed in a bath, the temperature of which is about ten degrees below that of the patient; gradually, by the addition of ice or ice-water, bring the temperature of the bath down to 68° Fahr. or 70° Fahr. The patient must be kept in the bath until his temperature falls to 101° Fahr. or 102° Fahr., then taken out, quickly dried and placed in bed. For some time after the removal from the bath, the axillary temperature will continue to fall, as the trunk parts with heat to the extremities. As soon as the temperature rises again to 104° Fahr. the patient must receive another bath. If the patient is suffering with intense pain in the head, or is actively delirious during the bath, ice-bags may often be applied to the head with benefit.

“As soon as you have passed the first week of the disease, having kept the patient’s temperature below 103° Fahr., usually it will not be necessary or advisable to continue the baths.”

The *constipation* of typhus may be relieved by the administration of enemata of strong, warm soap suds or of thin gruel.

Stimulants are very generally required in typhus fever, after the fourth day. They are seldom needed before the appearance

of the eruption, and are most useful in the second week, especially at the approach of the crisis. They should be given in cases of great prostration with low muttering delirium and a tendency to coma, and continued for several days, especially if under their administration, the patient becomes stronger and more rational. A copious, dark eruption with coldness of the extremities, calls for stimulants; while active delirium, headache, scanty urination, and intense heat of the cutaneous surface render their administration inadvisable. As in other fevers, the first sound of the heart and the character of the pulse are the best indications.

No positive instructions can be given as regards the amount of stimulation required in each case. The quantity necessary varies from one ounce to ten or twelve ounces of brandy or whisky, daily administered in tablespoonful doses. It is rarely necessary to give more than eight ounces in twenty-four hours. Brandy, whisky and champagne are the best stimulants. Where steady stimulation is called for, a tablespoonful of brandy or whisky punch (prepared by putting two tablespoonfuls of brandy or whisky into a tumblerful of milk) may be given alternately with two tablespoonfuls of beef essence (p. 190) or of beef tea (p. 193), every two hours.

Ale or porter may be allowed, if desired, during convalescence, in preference to other stimulants.

Premature exposure, over-exertion and excessive eating should be carefully guarded against.

LECTURE XX.

Relapsing Fever.

I shall speak to-day concerning *Relapsing fever*, the second in our list of contagious fevers.

Definition.—It may be defined as an acute, peculiar, contagious fever, occurring in the form of an epidemic, chiefly met with during seasons of scarcity and famine, due to the action of a specific poison, supposed to be a *spirillar organism*. It is characterized by a succession of febrile and non-febrile events, and consists of: 1. The *primary paroxysm*, marked by quick onset, commonly at sunset, with or without chills or rigor; frontal headache, arthritic and muscular pains; a coated tongue, thirst, anorexia and constipation; tenderness over the liver and spleen; high-colored urine; high and persistent pyrexia; a rapid but weak pulse; occasionally delirium; and a typical crisis on the fifth, sixth or seventh day, almost invariably attended with copious perspiration. 2. An *intermission* when the patient, though extremely debilitated, feels perfectly well, and which, when a relapse supervenes, comes to an end in seven days. 3. A *first relapse* which is usually ushered in at noon, with or without a distinct chill; runs a course similar to that of the attack of invasion; and terminates by an abrupt crisis on or about the fifth day. *Convalescence*, which is generally rapid, usually takes place upon the termination of the first relapse; occasionally a second, and still more rarely a third or fourth relapse occurs. A fatal result is infrequent, but may happen in consequence of sudden syncope, hemorrhage, or from suppression of urine and coma. No constant specific lesions are found upon examination after death. One attack affords no im-

munity from subsequent attacks. The duration varies from fourteen to twenty-six, or thirty-nine days. The period of incubation varies from five to seven days.

Synonyms.—It is otherwise known as *spirillum fever*, and has been described by different writers as famine fever, five day fever, seven day fever, short fever, bilious relapsing fever, hunger-pest, Gujerath sickness, contagious or jaundice fever, Silesian fever and Bombay fever.

History.—Relapsing fever is by no means a new disease, as there are numerous evidences of its having existed from a very early period. Spittal referring to its antiquity, states that the epidemic described by Hippocrates as having occurred more than twenty centuries ago, in the island of Thasos, in the Ægean sea, off the coast of Roumelia, must have been relapsing fever. In modern times the disease has prevailed at different epochs, and was first clearly described by Dr. John Rutty, of Dublin, in 1739.

Wide-spread epidemics of relapsing fever and typhus fever prevailed in Ireland and Scotland in 1817-19.

Following a commercial crisis, they again broke out in Ireland, in the summer of 1826, and extended to England. For sixteen years thereafter, relapsing fever remained unobserved.

An outbreak occurred in 1842, starting first on the east coast of the county of Fife, and extending over Scotland and England.

The first epidemic occurred in this country—where relapsing fever is not indigenous—in 1844, and was directly traceable to the landing of two infected Irish female emigrants from a Liverpool packet, at Philadelphia.

Following the failure of the potato crop in 1846, an extensive epidemic started in Ireland, and extended all over the British Isles. About this time an epidemic, consisting partly of relapsing fever and partly of typhus fever, prevailed in upper Silesia.

From 1847 to 1851 it appeared again in New York and Buffalo, and in several of the larger Canadian towns.

During the summer of 1855, it prevailed among the British troops in the Crimea.

Following the liberation of the serfs, it appeared in Russia, principally among the poorest and most destitute classes; first

at Odessa, in 1863, and then at St. Petersburg, in 1864, where it has prevailed ever since.

In 1867, typhus fever and relapsing fever reappeared in Silesia, and extended in the following year to Germany.

In 1869-70 it prevailed to a considerable extent in Philadelphia, New York and other large cities of this country. Like the former epidemic it was directly traceable to importation through Irish and German emigrants.

In the latter part of 1872, relapsing fever broke out in Berlin, and reappeared in 1878 and 1880.

It prevailed in the Bombay Presidency, and in Northern and Western India, from 1877 to 1880.

An extensive epidemic, occurring mostly among males, prevailed at Königsberg, in 1879 and 1880.

Nearly all the epidemics of relapsing fever have originated in Ireland, and have generally been associated with want and overcrowding. Central foci are supposed to exist in the Asiatic provinces between Russia and India.

Etiology.—The causes of relapsing or spirillum fever, are of two kinds, viz., predisposing and exciting.

1. *The Predisposing Causes.*—*Age* exerts a slight influence. Nearly one-third of all cases occur in early life, and about one-fourth occur between the ages of twenty and thirty years. After fifty years of age the disease is rarely observed.

Occupation, except as it involves actual exposure, as is the case with hospital internes, physicians, nurses, etc., does not predispose to relapsing fever.

Destitution and bodily fatigue play the most important part among the predisposing causes of the fever. The connection of spirillar infection with individual want is very marked. Failure of crops, or scanty food necessitated by hard times, has preceded almost every epidemic. Occasionally the disease has developed and spread among those who were well-to-do, and were well fed. But, as a rule, no great epidemic has ever arisen or spread to any considerable extent among a prosperous and well-fed people.

Exposure to heat or wet, with or without excessive physical exertion, has been observed to have a special predisposing effect.

Over-crowding exerts a powerful predisposing influence. Infected localities are usually those limited districts where pauper

emigrants congregate, and where excessive over-crowding of apartments or of houses is the rule.

2. *The Exciting Cause.*—Since the discovery by Otto Obermeier, in 1868, of the constant presence of certain thin, thread-like, spiral fungi—*spirochæti*—in the blood of relapsing fever patients, the parasitic nature of the contagion and the possibility of the existence of pathogenic bacteria have become almost positively established. These spiral filaments (fig. 6) named by Cohn, *spirillum Obermeieri*, in honor of their discoverer, are exceedingly slender, seldom measuring more than 0.15 to 0.2 mm. in length, and 0.001 mm. in diameter. In them, we, in all probability, have the infecting principle of relapsing fever, which admits of being conveyed from the sick to the healthy, and is capable, under favorable conditions, of undergoing development and indefinite reproduction. And yet, notwithstanding it is a generally accepted belief that the spirillum is the cause, and not simply an accompaniment of the disease, our present knowledge would not justify us in declaring any given case, not one of relapsing fever, because the fungal mycelia are not found during the stage of pyrexia.

The question whether or not the spirillum alone and *per se* produces the fever, cannot be definitely answered until its pathogenic power after cultivation, as well as after simple isolation, has been tested. Drs. Koch and Vandyke Carter have succeeded in producing relapsing fever in monkeys, by inoculation with fresh spirillar blood, but failed to produce infection with either non-spirillar or desiccated blood. They also succeeded in their culture experiments with infected serum, alone or after dilution with aqueous humor, outside of the human body, but found that the spirillum does not grow as freely as does the bacillus anthracis. They have not as yet succeeded in producing the fever by inoculation with the cultivated spirillum, but their success in producing charbon or splenic fever, with the cultivated bacillus anthracis proves that diseases can be so produced, and destroys the theory, held by a few, that septic poisoning alone is the cause of pyrexia.

True to its plant life, it is probable that the spirillum observes that periodical order of growth which belongs to the vegetable kingdom, and as a natural inference the periodic recurrence of fever, must be intimately associated with corresponding growth-

states of the parasitic organism. The maintenance of fever is strictly commensurate with sustained parasitic growth; and the sudden termination of fever is unquestionably related to cessation of parasitic growth. Each apyretic interval is strictly the incubation period of the following febrile event. Some of the fatal and more serious results of spirillar infection are referable to the premature growth of spirochæti in the blood, causing increased liability to obstructions of the circulation. The death of the parasitic organisms is supposed to depend upon the degree of consistency of the blood. Spirillar filaments have been detected in hemorrhagic effusions and in the menses, but have not as yet been found in the saliva, sweat or urine.

Direct importation is, at least in this country, the probable method of introduction of relapsing fever. The apparently independent origin of some epidemics may be explained by considering that with a return of the conditions adapted to their growth, the germs or "lasting spores" produced during previous illness, and remaining for a long time dormant in the earth or building, may become suddenly revived. A purely spontaneous origin is, in these progressive times, absolutely inadmissible.

As soon as relapsing fever has appeared in any locality, it not only spreads with great rapidity, but also tends to form pestilential centers for itself, in districts inhabited by the poor. The contagion is only freely communicable by the atmosphere, as only those attendant upon the sick, or who visit them in their close, illy-ventilated quarters, or live in adjoining apartments or dwellings, are liable to take the fever. The probable channels of infection are, the breath and the cutaneous transpiration of the sick. Impure drinking water is believed by some to be an important carrier of the infecting principle.

The role of *fomites* has not as yet been clearly ascertained. In some epidemics, especially in this country, the laundry women in hospitals were never affected by the fever, while in others, particularly in Ireland, they contracted the disease without direct contact with the sick. Exceptionally the disease has been transported to a distance by infected clothing. Sleeping on empty ward-cots, previously occupied by persons sick with relapsing fever, has frequently led to the illness.

By the inoculation of fresh febrile blood, on healthy men, the

incubation period has been ascertained to be not less than five, nor more than eight days.

One attack affords no immunity from subsequent attacks. In Ireland, Russia, India and Egypt, the social conditions and relations of the pauper population are such as to render the disease practically endemic within certain areas.

From this brief review of the etiology of relapsing fever, we are led to the following conclusions:

1. That it is due to a specific poison, probably the spirillum Obermeieri.
2. That the poison is communicated from the sick to the healthy, solely by actual contact with the personal exhalations of the patient.
3. That the disease is communicable during its successive febrile manifestations, and also for a short time both preceding and following the earliest of these.
4. That, while *famine*, over-crowding and bad ventilation favor its spread and increase its severity, they never originate it.
5. That the poison passes into the system mainly through the respired air.
6. That a prompt re-infection is possible, no immunity being conferred by a first attack.

Forms.—Relapsing fever may be arranged, according as the fever does or does not return, into two main forms:

1. *The Abortive Form*, characterized by a single febrile attack—common in the lower animals, but uncommon in man.
2. *The Recurrent or Ordinary Form*, with *one relapse*—most frequently seen; with *two relapses*—less frequent; with *three relapses*—rare; with *four relapses*—very rare.

Clinical History.—The clinical history of the ordinary form, embraces a description of the invasion attack or primary paroxysm, the first non-febrile interval or stage of intermission, the second attack or relapse, and convalescence.

The Primary Paroxysm.—Prodromes are seldom recognized, as the onset of the disease is usually abrupt. Commonly about sunset the patient is seized with a high fever, ushered in by a severe rigor or by a distinct chill. Accompanying the chill there are severe headache (usually frontal), pains in the spine and limbs, nausea and, not infrequently, greenish vomiting with a

sense of weakness and indisposition for exertion. The temperature rises rapidly, and may reach 104° Fahr. in the morning and 105° Fahr. in the afternoon of the first day. During the two or three days following there is but little variation, the acme being frequently reached during the first twenty-four hours. The pulse is soft and compressible; like the temperature it increases rapidly, and may vary from 110 or 120 to 140 or even 160 per minute within the first twenty-four hours. The eyes become injected early; the tongue is white and moist, occasionally if there is a typhoid tendency it becomes dry. The bowels are constipated; thirst is considerable.

As the disease progresses, the pains in the back and extremities increase in intensity, and are stabbing and lancinating in character. They extend to all parts of the body, but are most severe in the calves of the legs. Sleeplessness, as a result of the muscular pain is a frequent and distressing symptom. The mind usually remains undisturbed; occasionally active delirium occurs. The liver and spleen become large and tender, after the second day, and there is more or less delirium. The urine is scanty, shows a sp. gr. of 1015 to 1017, is acid in reaction, deficient in chlorides, and contains no albumen; when jaundice is present, it contains bile pigment.

In the evening or during the night of the sixth or seventh day, after a brief augmentation of all the symptoms, a remission suddenly occurs, attended by a profuse perspiration. The temperature falls 5° , 7° or even 10° , so that in the morning the body-heat may be below the normal standard. The pulse declines, but becomes small and feeble. The number of respirations also diminishes, and the breathing approaches the normal. The headache, the muscle pains and the abdominal uneasiness subside. The tongue speedily cleans, the appetite returns, and the jaundice begins to fade. The spirilla observed in the blood during the paroxysm have now disappeared. And, excepting a sense of weakness, the patient, who but yesterday was watched with great anxiety and alarm, now regards himself well. He has, however, only entered upon the stage of intermission.

The Stage of Intermission.—After about a week, sometimes not more than three or four days of apparent convalescence, usually between the twelfth and twentieth days of the disease,

the patient is taken suddenly ill with all the phenomena of the primary fever, and enters upon the stage of relapse.

The Stage of Relapse.—The advent of the second attack, which usually occurs at noon or in the night, is generally attended by chilliness or rigors. The pulse increases in frequency, but reaches its maximum more slowly and gradually than in the primary paroxysm; occasionally within twelve hours it reaches 140 per minute. The temperature rapidly rises to 102° Fahr.—exceptionally to 106° Fahr. or 108° Fahr.—on the first day; but soon the body-heat is higher than during the invasion attack. The common symptoms are usually those of the primary paroxysm, only they are, as a general rule, less marked, and are attended by greater debility. As in the primary paroxysm, the blood-spirillum is always found upon microscopic examination.

The duration of the relapse varies from two to seven days; usually it is about three days. Generally the second crisis, which occurs oftenest during the night, is as abrupt as the first, being accomplished in a few hours, and accompanied by a profuse perspiration. From this period the patient usually goes on to complete recovery. When a second relapse takes place, the mean duration of this, the second non-febrile interval or intermission, is ten days, and that of the relapse is two or three days. As many as three or four relapses may occur, but generally convalescence is assured after the second non-febrile interval.

Convalescence.—Convalescence, which usually lasts as long as all three preceding periods—three to six weeks—is marked by a condition of comparative comfort. But, notwithstanding the rapid return of the appetite, the emaciation, the loss of strength, and the arthritic and muscular pains remain for some time. Anæmic murmurs, frequently noticed during the course of the fever, are often present during the first half of the convalescing stage. Post-febrile œdema of the feet and sometimes of the hands and face is not infrequent.

The death-rate in relapsing fever seldom exceeds two or three per cent. Death may occur, usually at the close of the relapse, from the intensity of the fever, and the consequent exhaustion. In a limited number of cases it may take place in consequence of lung complications, sudden heart-failure, cerebral hemorrhage, pyæmia following splenic abscess, or from urinary suppression with coma and convulsions.

Complications.—*Pneumonia*, often double, is a frequent and serious complication of relapsing fever. When death occurs from this complication, it is usually within a week or ten days after the first crisis.

Cerebral hemorrhage is a frequent and fatal complication, occurring mostly about the termination of the specific fever. It is marked by the rapid onset of cerebral compression, the speedily deepening coma, and the previous absence of head symptoms. Contracted pupils, when present, indicate surface cerebral irritation.

Sudden collapse and death from heart-failure may occur as a result of organic disease.

Post-febrile ophthalmia is a not infrequent complication, appearing usually a few days after the invasion attack. It occurs oftenest in adult males, and affects chiefly the right eye.

Diarrhea and dysentery often appear as complications. They occur most frequently during the relapse, and in some epidemics they are so severe and exhausting as to cause death.

Enlargement of the spleen at times remains persistent; in rare instances *abscess* accompanied by pyæmic symptoms occurs.

Anæmia not infrequently occurs as a sequel.

Duration.—The duration of an *abortive* attack of relapsing fever is fourteen days, of which seven are febrile. That of an *ordinary* attack with one relapse is twenty-six days, of which twelve are febrile. Rarer attacks with two relapses have an average duration of thirty-nine days, of which fifteen are febrile.

ANALYSIS OF CHART.

The Nervous System.—*Vertigo* occurs as an early symptom, and is more or less marked during the first and third stages of the fever.

Headache is the commonest of all symptoms. It is chiefly frontal, and the feeling is oftenest described by patients as "great heaviness," sometimes as "splitting" or "throbbing." Its duration is usually limited to that of the febrile state. In the severer forms of the disease, marked at the close by delirium, the headache is often severe.

Muscular, arthritic and osseous pains are nearly always present. They commonly appear with the fever, augment and decline

CHART XIII.—*Relapsing Fever.*

Nature:	Epidemic		Contagious		
Etiology:	The <i>Spirillum Obermeieri</i> .		Famine.		
Initial Symptom:	Chilliness or rigors.				
Stages	Prim'ry	Paroxysm	Intermis-	Relapse	Convalescence.
Duration:	Six to seven days.		Three to seven days	Two to seven days	Three to six weeks
Cutaneous Surface:	First dry then moist.		Moist	Dry and hot.	Occasionally desquamation.
Nervous System:	Vertigo, Insomnia Frontal headache. Muscular pains.			Headache. Mus- cular pains. Great debility.	Debility. Muscu- lar weakness.
Temperature:	Rises rapidly 104° or 105° 1st day.			Rises rapidly. 102° to 108°.	Normal
Pulse:	110° to 160° Full and frequent		RESIDUE DEBILITY	110 to 140. Soft. Compress- ible.	Slow Anemic Mur-
Tongue:	White or yellowish White fur. Moist			Furred.	Clean and moist
Bowels	Constipated.			Constipated.	Normal
Stomach:	Thirst Nausea. Greenish vomit- ing Epigastric tenderness.			Vomiting. Epigastric tender- ness.	Normal appetite.
Liver:	Enlarged. Jaundice.			Enlarged. Jaundice.	Normal.
Spleen.	Enlarged.			Enlarged. Abscess.	Returns to Normal.
Urine.	Scanty. Dark. Low sp gr		Normal	Scanty. Dark. Slightly albumin	Normal
Blood:	<i>Spirillum</i> present.		<i>Spirillum</i> absent.	<i>Spirillum</i> present.	<i>Spirillum</i> absent
Defervescence.	Rapid and critical on 6th or 7th day.		Attained.	rapid and critical on 15th to 25th day.	Attained.
Complications	Bronchitis. Cerebral hemorrhage.		Pneumonia.	Ophthalmia. Splenic abscess.	
Prognosis	Favorable		Mortality 1% from 2 to 4 per cent.		
Recurrences:	A previous attack affords no immunity.				
Incubation:	Five to seven days				

with the changes of pyrexia, and subside at the crisis, leaving behind them marked muscular weakness.

Debility comes on early, and is generally marked. It is not as severe as in typhus fever, but being commonly associated with vertigo and arthritic and muscular pains, it compels patients to take to their beds. The ordinary strength is not regained until convalescence is far advanced.

The Digestive Tract.—*Thirst* is a constant symptom during the fever. It is usually most persistent and intense in subjects of low type of fever.

Appetite is usually wanting during the fever. At the critical fall it often returns as promptly as the other signs of relief. An inordinate appetite has been noticed in some cases, near the end of a relapse, just before probable acme and sudden death by cerebral hemorrhage.

The *tongue*, as a rule, undergoes changes corresponding very closely with those taking place upon the cutaneous surface. It is dry when the latter is dry, and moist when it is moist. It is generally coated, the fur being either whitish, yellowish-white or brownish in color. Occasionally the organ is flabby and indented at its edges by the teeth. Sometimes, particularly in young persons, the papillæ are enlarged, and the tongue presents a "strawberry" aspect. Pallor of the tongue usually attends the crisis.

Nausea, either alone or preceding and alternating with vomiting, is a not infrequent symptom.

Vomiting occurs alike in the abortive and ordinary or relapsing forms of the fever. It is generally active in character, and occurs oftenest in young men. The vomited matters consist of the ingesta, and of glairy mucus and diluted bile of varied hue. Specks and small streaks of blood are sometimes present in the ejected mucus. At times, when the stomach is unusually irritable, the change of posture will induce the recurrence of vomiting.

Epigastric tenderness is a common symptom. Notable tenderness exists, in some cases, over the liver and spleen.

Splenic enlargement is a prominent and characteristic symptom. It occurs early and may often be detected during the first twenty-four hours. It steadily increases in size during the febrile period, and rapidly diminishes in the intermission and during

convalescence. At the close of the primary paroxysm it has attained its maximum size, which may be two or three times its natural bulk. It can then be felt through the abdominal walls.

The *liver* is slightly enlarged.

Jaundice occurs in a small proportion of cases. It rarely appears before the third or fourth day of the invasion attack, disappears during the intermission, and reappears during the relapse. It is seldom persistent, usually vanishing in a few days.

Constipation may be present for a few days before the onset of primary fever. Usually the alvine functions remain undisturbed. Intestinal catarrh sometimes occasions more or less persistent diarrhea.

The Temperature.—In well-marked uncomplicated cases the course of the fever is typical (fig. 16). The temperature rise is always sudden and is usually connected with increasing growth and spore production in the blood. Often during the initial chill or rigor it reaches 102° Fahr., and generally within twenty-four hours it goes up to 104° Fahr. or 106° Fahr. Not infrequently it attains its maximum on the first day. Generally the highest temperature is observed just before the crisis. The temperature curve is irregularly remittent, being interrupted by solitary peaks of exacerbation. The morning and evening variations in the diurnal curve, range from a few tenths to one or one and a half degrees.

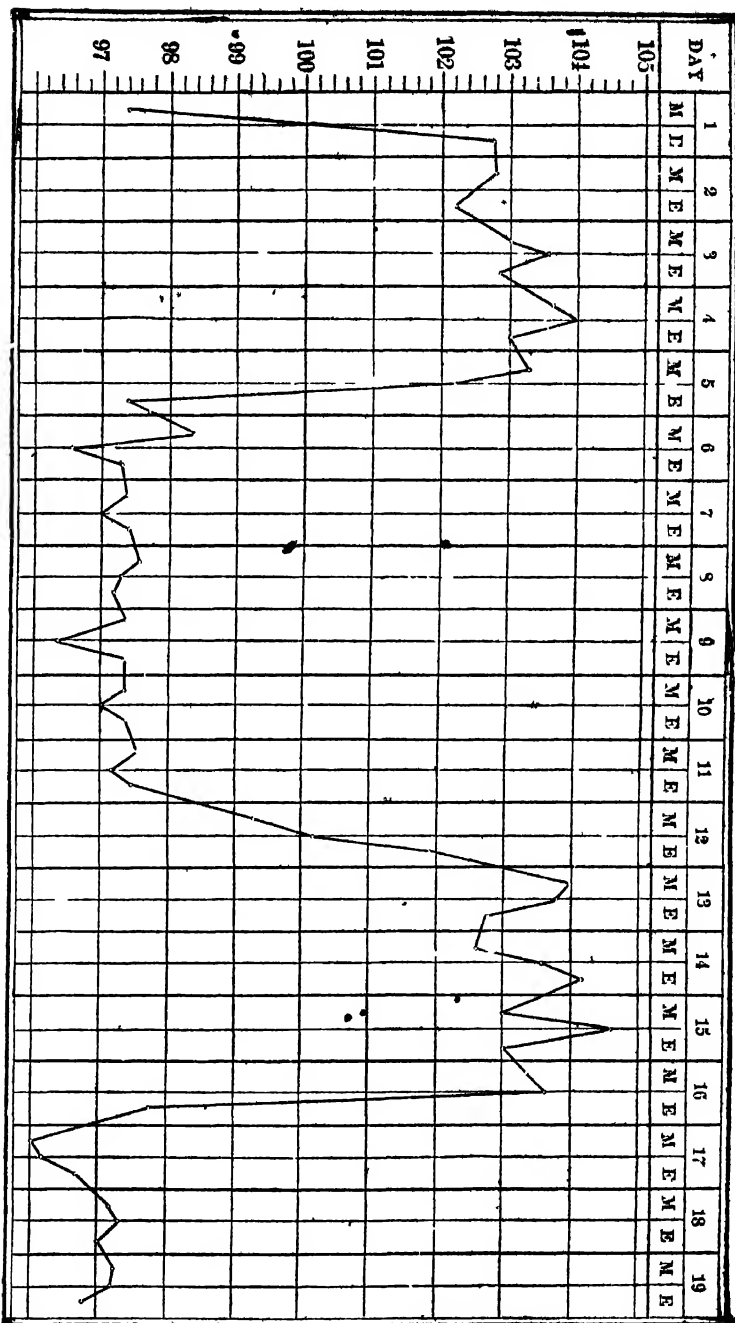
At the crisis the downfall occurs with a rapidity that is characteristic. The temperature falls from 4° Fahr. to 10° Fahr. in an unbroken line within twelve hours. For one or two days the morning temperature may even be sub-normal— 95° Fahr. to 97° Fahr.

With the onset of the relapse, the temperature rise is again quite sudden, reaching 102° Fahr. or 104° Fahr. in an abrupt line within a few hours. The peaks grow daily higher and higher, and the last represents the maximum temperature of the relapse, which is somewhat higher than that of the primary paroxysm— 105° Fahr. to 108° Fahr.

Defervescence usually succeeds by a rapid and unbroken fall of 7° Fahr. or even 12° Fahr. in twelve hours—a fall greater than that of any other disease.

The Pulse.—The pulse rises rapidly, and varies from 90 to

FIG 16



Temperature Range in Relapsing Fever (after Murchison)

120 or 140 per minute. It is eight or ten beats faster in the evening than in the morning. It is often full and tense during the febrile paroxysm, but becomes soft and compressible after the crisis. During the rapid defervescence following the crisis it may fall from 140 to 50 in a few hours.

The cardiac impulse and first sound are weakened after the crisis, but gradually regain their power as convalescence becomes established. During the primary paroxysm and the relapse, soft systolic murmurs are not infrequently heard upon auscultation, at the base of the heart.

The Cutaneous Surface.—In both the primary paroxysm and the relapse, the skin becomes moist shortly before the temperature declines. The critical termination of the relapse is often attended with sweat, more copious than in an intermittent paroxysm. In most cases the sweating is so excessive that the clothes and even the bedding become saturated. Partial or nocturnal sweating is not uncommon for two or three days after the crisis.

Sudamina, varying in size from a pin point to a split pea, are observed in some epidemics. They are commonest at the crisis; sometimes they appear in successive crops. A branny exuvium or a desquamation of the cuticle in flakes sometimes occurs.

The Urine.—The urine-changes in relapsing fever are singularly slight. At or near the acme, the urine is scanty, acid, and high-colored. Though clouded, it leaves no lateritious deposit on cooling, such as is found in other febrile diseases.

Albumen in small proportions is not uncommon. Blood and tube-casts are rarely observed. When jaundice exists, bile pigments are present in the urine.

Morbid Anatomy.—No invariable lesion is found after death from relapsing fever. The special features of the disease are principally cerebral hemorrhage, pneumonia, collapse of the lungs, enlargement and pallor of the liver and kidneys, enlargement or firmness and infarcts of the spleen, congestion and extravasations in the intestinal walls.

Emaciation is rarely extreme.

Cadaveric rigidity appears early and is long continued.

The brain presents no characteristic changes. Serous effusion, usually clear and yellowish, and practically limited to the

loose sub-arachnoid tissue at the vertex and sides of the brain is sometimes observed. Marked effusion is most commonly seen at the close of the febrile paroxysm. More or less copious hemorrhages in the arachnoid and sub-arachnoid spaces, especially over the upper convexity of the hemispheres may be found. Fatty degeneration of the smaller vessels sometimes attends the cerebral hemorrhage. The deeper seated substance of the brain rarely becomes affected. Heydenrich and Carter have noticed the possible formation of emboli in the smaller vessels from the clustering and aggregation of the spirilla into compact masses.

The spleen will be found considerably enlarged, especially if death has occurred during the febrile state. The capsule is thickened, smooth, tense and slightly clouded, and the malpighian tufts are more prominent than normal. After the crisis the organ will be found to be diminished in size, and the capsule will present a shriveled appearance. Wedge-shaped infarctions, or altered portions of the spleen-pulp, are occasionally met with. They are commonest at the edges of the organ. Exceptionally they break down and form abscesses.

The liver is commonly enlarged and of a yellowish-gray hue. The enlargement may be due to cloudy swelling and pigmentary or fatty transformation of the gland cells. Congestion is oftenest noted immediately after the cessation of fever.

The kidneys are enlarged, flabby, friable and of a pale yellowish color. Congestion of the mucous membrane of the pelvis, and cloudy swelling of the renal cells are frequently seen.

The stomach frequently displays small spots of blood extravasation upon its mucous surface.

The intestines present no changes other than those of congestion, inflammation or hemorrhage, affecting the ileum and lower end of the jejunum.

The heart, in a large proportion of cases, shows no structural change. In some instances fine, granular infiltration of the muscular fibres has been observed. Blood-clots are generally present in the heart-cavity; and small quantities of clear serum are frequently found in the pericardial sac.

The lungs frequently display the changes in structure incident to the occurrence of bronchitis or pneumonia as complications.

The blood of relapsing fever patients presents a number of striking changes. During the primary paroxysm, for the first

few days the plasma is often clear, later on it becomes clouded. The white blood-cells are increased in quantity, and the red discs frequently present a bent or cupped, shriveled aspect. Leucocytes increase in numbers as the attack progresses, until the acme is reached. Large, colorless granule-cells are frequently observed at the close of the febrile period. They are oftener found in the relapse than in the primary paroxysm. Their source is supposed to be from the spleen and lymphatic system. Filaments, granules, or short rods have also been observed. They have been noted during the primary paroxysm, but have been oftenest seen at the critical defervescence. Their nature and origin is unknown.

Spirilla or spirochæti are commonly present. As seen in freshly drawn blood, they appear as colorless, slender, twisted filaments, actually moving in the liquid plasma, until coagulation begins, when they seek refuge amongst the red corpuscles. The quiescent filaments have a length of, from two to six times the diameter of a red disc. They resemble a spiral rod, with from four to ten spiral turns. From five to ten spirilla are generally visible in the field of the microscope at one time; occasionally they appear in swarms. As a rule, not less than one spirillum will be found in an ordinary specimen—one-fourth of a drop—of infected blood. If there are 250,000 millions of red discs in the human body, one spirillum to one thousand discs would give an aggregate of about two hundred and fifty millions of blood-parasites.

Spirilla are absent during the early stage of the incubation period, but are present during the latter part of it. They rapidly increase with the advent and during the progress of the fever. They disappear, as a rule, rapidly, with the cessation of the fever. The ordinary duration of individual spirillar organisms has not been ascertained. The length of visible blood infection varies from two or three to eight or ten days.

By contact with the sick, or by inoculation of blood containing these spiral organisms or their germs, relapsing fever may be conveyed to new or old subjects.

Differential Diagnosis.—The diagnosis of relapsing fever after the disease has ended is extremely easy; but at the beginning of an epidemic, during the primary paroxysm, it is often attended with difficulty.

The distinctive characters are, the abruptness of invasion, the unusual rise in temperature, the prominence of severe muscular pains of a rheumatic character, the occasional occurrence of jaundice accompanied by more or less tenderness and fullness in the hypochondrium, the critical defervescence about the fifth or seventh day, and the almost constant occurrence of a relapse on the twelfth or fourteenth day.

The *pathognomonic test*, I would have you remember, is the presence of *spirilla in the blood* during the periods of invasion and relapse. Do not understand me as saying that the disease is to be invariably recognized by this blood-test, but believe me as affirming that the experiments of recent investigators demonstrate that when the test is applicable it settles for good a doubtful diagnosis.

To demonstrate the spirilla it is necessary to employ magnifying powers of not less than 500 diameters, and for special investigation the higher power-immersion-lenses are needed. Carter recommends that a minute drop of fresh blood be taken from the washed finger of the patient, by pricking with a needle, and placed on a thin glass cover, which is then inverted and put on the slide for examination. The examination is best conducted by daylight. In cases of doubt more than one specimen should be examined. Dried specimens are not as serviceable as fresh ones.

The diseases with which it is possible to confound relapsing fever are, typhoid fever, typhus fever, cerebro-spinal fever, remittent fever, yellow fever, dengue, small-pox (previous to eruption) and measles.

The chief points of contrast between *relapsing fever* and *typhus*, *typhoid* (p. 166) and *cerebro-spinal* (pp. 166 and 236) *fevers*, you are already so familiar with that their repetition is unnecessary.

Remittent fever, especially when tropical or sub-tropical, occasionally closely resembles relapsing fever. It differs, however, by being of malarial origin, and by showing pigment granules and the bacillus malarie (p. 55) instead of the blood-spirillum.

Yellow fever sometimes closely resembles relapsing fever. The latter, however, is always propagated by contagion, while the former is not. An enlarged spleen is the rule in relapsing

fever, and the exception in yellow fever. In all cases an examination of the blood will prevent error.

Dengue may be distinguished by the eruption and by the character of the remissions.

Small-pox presents some points of resemblance to relapsing fever during the period of invasion. After the third day, the diagnosis is rendered positive by the decline of the fever, and the appearance of red spots along the edges of the hair.

Measles is to be diagnosticated from relapsing fever by the eruption, by the course of the fever, and by the catarrhal symptoms of the premonitory stage.

Prognosis.—The prognosis in relapsing fever is favorable, the death-rate being about three per cent. The greatest risk of life attends the primary paroxysm and the first relapse. Absence of crisis after the seventh day of the primary paroxysm should excite apprehension. If, after the crisis, the liver and spleen continue enlarged and tender, there is risk of pneumonia or dysentery. Shortening and interruption of the post-critical deferescence indicates risk from complications.

Usually death occurs, not from the disease, but from some complication. The greatest danger is from sudden syncope. A fatal termination may occur from pneumonia, uræmia, dysentery or cerebral hemorrhage.

One attack confers no immunity from reinfection.

Treatment.—*Prophylaxis.*—As over-crowding, poverty and famine are strong predisposing causes of relapsing fever, the poor of an infected district, should, upon the outbreak of an epidemic, be provided with sufficient wholesome food, and more spacious apartments. Valid sanitary preventive measures should be early applied. All defective drainage should be remedied, all filth and garbage should be removed. All waters used for drinking purposes must be boiled before used. Adequate home and personal hygiene should be observed. Infected houses should be evacuated and thoroughly disinfected and cleansed. A camp of refuge should be established for the poverty-stricken patients. Abundant ventilation, and especially room-space for each patient, is of the first importance. In all large cities and in localities where relapsing fever frequently occurs, a permanent fever hospital is a sanitary necessity.

Absolute cleanliness in the sick room must be insisted upon. All soiled clothes should be thrown into a five per cent solution of carbolic acid, or some other disinfectant, and then immediately washed in boiling water. Platt's chlorides should be sprinkled upon the bed and about the room. After convalescence the patient's apartment should be fumigated by burning sulphur, and then thoroughly aired, the woodwork cleansed with carbolized water, and the walls whitewashed. The infected bedding should be disinfected by prolonged exposure to heat or to sulphur fumes, and then shaken or beaten and exposed to the wind and sunshine for several days.

Principal Remedies.—*Baptisia* is oftenest indicated in the early days of the invasion attack, and when gastric symptoms predominate. It is reported as having lessened the severity of the disease, and hastened the crisis. *Bryonia* is the best remedy during the latter days of the primary paroxysm, and in the relapse. *Arsenicum* stands next to bryonia, and is indicated during the fever when watery diarrhea and vomiting are present. *Eupatorium perf.* will be of service when the rheumatoid pains are very severe, and when there is great tenderness in the epigastrium and right hypochondrium. *Nux vom.* is usually indicated during the intermission. *Helonin* or *merc. cor.*, may be given as an intercurrent remedy for albuminuria; and *cantharis* or *apis* for difficult urination with scanty discharge. Urinary retention calls for either *opium* or *hyos.* *Phosphorus* or *phosphoric acid* will be frequently needed during convalescence. *Berberis vulg.* will prove serviceable when there is considerable enlargement of the spleen; and *merc. bi-jod* when both the liver and spleen are enlarged.

Leading Indications.—*Aconite*.—In the first paroxysm when there is high fever, great restlessness and anxiety, full, hard, quick pulse, and pain in the forehead and temples. Great thirst for small quantities of cold water prevails during the paroxysm (*ars.*, *opp. bry.*). In sanguine and plethoric individuals.

Apis mel.—Great desire to sleep. Soreness of the limbs and joints. Great soreness in the pit of the stomach when touched (*bry.*). Soreness in the region of the spleen. Urine scanty and high-colored. Suppression of urine (*hyos.*, *opium*). Oppres-

sion of the chest with a sensation of smothering during the paroxysm.

Arnica.—Great weariness compelling the patient to lie down, yet the bed feels too hard (*bapt.*). Confused feeling in the head with pressure over the right brow. Great heat in the head with coldness of the body; cold sensation at a small spot on the forehead. Heat intolerable during the fever, but the slightest motion of the bedclothes causes chilliness. (*nux*). Petechiæ.

Arsenicum.—Great restlessness and anxiety. Death-like color of the face (*carbo. veg.*). Pain and distension in the left hypochondrium. Aversion to food. Tongue furred at the edges, with red streak in the center, and red tip. Thirst for cold water, wants little at a time but often (*aco.*, *cinch.*, opp. *bry.*). Burning in the stomach with vomiting and diarrhea. Small, weak, compressible pulse. Great weakness and prostration after the paroxysm (*verat. alb.*) Œdema of the extremities.

Baptisia.—Great nervous restlessness, especially at night. Dull, stupefying headache (*gels.*). Head feels as if scattered about; tries to get the pieces together. Dark, red face with besotted expression. Tongue coated, brown and dry, particularly in the center. White furred tongue with red edges. Tired, bruised, sick feeling all over the body. Feeling as if the lower limbs were separated from the body (*opium*). Patient changes position frequently because the bed becomes too hard (*arnica*). Offensive secretions.

Bryonia.—Desire to lie down during the fever; setting up causes nausea and vomiting; vomiting first of bile, then of fluids. Violent throbbing headache, as if the head would burst. Vertigo with sensation as of the head turning in a circle (*bell.*). White or yellow coating on the tongue. Excessive thirst, drinks large quantities at a time, and at long intervals. Stitches in the liver and spleen (*merc.*). Sweat on single parts only, or on side on which the patient lies. Neuralgic and rheumatic pains, worse on motion. Fullness and oppression in the pit of the stomach and bowels. Epigastric region painful to touch and pressure.

Camphor.—Sudden and great sinking of strength (*ars.*). Cold sweat all over the body (*verat. alb.*). Sudden sinking spells. Small, weak, scarcely perceptible pulse (*carbo. veg.*).

Great thirst; coldness of the tongue (*carbo. veg., verat. alb.*). Extreme sensibility to cold air (*nux*).

Chamomilla.—In children and in nervous adults. Gastric symptoms (*bapt.*). Excessive sensitiveness to pain (*coffea*). Yellow coated tongue. Tongue white at the sides and red in the middle (opp. *tart. emet.*). Frequent emissions of large quantities of pale urine (*helonin*).

Cimicifuga.—Neuralgia in the forehead and eyeballs. Sinking sensation at the stomach with nausea and vomiting. Nervous weakness and prostration. Excessive muscular soreness. Obstinate sleeplessness. Threatened abortion.

Cinchona.—Sense of internal illness as of impending disease. Pressure in the head from within outwards as if it would burst, relieved by hard pressure. Great lassitude and exhausting sweats during the intermission. Saffron yellow color of the skin; the patient looks jaundiced. Enlargement of the liver and spleen. Anæmic and cachectic appearance.

Eupatorium perf.—Headache with sore feeling internally. Nausea with retching and vomiting of bile. Bone pains in every stage. Pain in the back and limbs as if bruised (*arn.*). Thickly coated tongue with thirst and vomiting after drinking. Sallow-ness of the skin; morning diarrhea (*podo.*). Perspiration increases the headache, but relieves all the other pains (*nat. mur.*). Soreness of the region of the liver on pressure (*merc.*). Great tenderness of the epigastrium. Loose cough during the intermission.

Gelsemium.—Dullness of the mental faculties (*bapt.*). Great languor and drowsiness. Bruised pains in the muscles, general rheumatic symptoms (*cim.*). The tongue is coated whitish or yellowish and there is a sticky feeling in the mouth. Intense burning fever accompanied by a sensation of falling. Sweat is apt to be profuse and relieves the pain (*nat. mur.*, opp. *ferrum*). In children and nervous young people.

Leptandra.—Dull aching pain in the liver (*merc.*). Burning distress in the epigastric and hypochondriac regions. Constant nausea with vomiting of bile. Jaundice with clay-colored stools. Thin, black, fetid, watery evacuations with severe pains after stool. Chronic diarrhea and dysentery. Brownish urine.

Mercurius.—Great anxiety and restlessness. Heaviness in the head with great inclination to sleep. Swollen, soft, flabby tongue, taking the imprints of the teeth. Dirty-yellow coating on the tongue. Region of the liver painful and sensitive to contact (*bry.*, *eupat. perf.*). Icteric hue of the skin. Tearing pains in the joints, worse at night and in the warmth of the bed. Bilious, slimy or watery diarrhea. Sudamina.

Nux vom.—Gastric or bilious symptoms predominate. Hunger with great aversion to food. Flatulent distention of the abdomen after eating (*cinch.*, *lycop.*). Alternate constipation and diarrhea (*bry.*). Throbbing in the region of the liver (*bry.*). Profuse sweat after the severest paroxysms. Chilliness on moving the bedclothes. Has been recommended as a preventive.

Phosphorus.—Pale, sallow, or changeable color of the face. Inability to concentrate thought (*arn.*, *rhus*). Thirst with desire for very cold drinks (*rhus*). Region of the stomach painful to the touch. Feeling of coldness in the abdomen (*ars.*). Hard, dry cough with oppression in the chest. Loud mucous rales in the lower lobes (*ipecac.*, *tart. emet.*). Hepatization of the lungs. Rose spots and ecchymoses. Profuse epistaxis.

Phosphoric acid.—Pale, sickly complexion. Hemorrhage from the nose of dark blood (*ham.*). Grayish coating on the tongue. Headache, worse from the least shaking or noise (*bell.*). Feeling of heaviness in the region of the liver (*pod.*). Frequent, small, feeble pulse. Profuse night (*merc.*, *tarax.*) and morning (*cinch.*) sweats. Pressure in the stomach after eating. Thin, whitish-gray evacuations. In young persons who have grown very rapidly.

Rhus tox.—Fullness and heaviness in the forehead, worse from opening or moving the eyes (*puls.*). Dark, livid redness of the cheeks. Dry, red, cracked tongue (*bapt.*). Redness of the tip of the tongue in the shape of a triangle. Great thirst for cold drinks (*phos.*), especially cold milk. Dry, tickling cough worse in the evening and before midnight. Profuse sour morning sweats. Erysipelas with great burning.

Sambucus.—Intense heat with great dread of uncovering. Excessively abundant sweat. The perspiration continues through the intermission. Edematous swelling of the feet, instep and lower part of the legs.

Terebinthina.—Headache with intense pressure and fullness of the head. Tongue red, smooth and glossy. Vomiting of mucus, blood or bile. Small, weak, thready pulse. Cold, clammy sweat all over the body (*verat. alb.*). Burning, drawing pains in the kidneys with bloody urine. Strangury. Great prostration.

Veratrum alb.—Sudden sinking of strength. Hippocratic countenance. Cold perspiration, especially on the forehead. Tongue cold (*carbo. veg.*) or coated white with red tip and edges. Violent thirst for cold water (*ars., phos.*). Spasmodic constriction of the throat. Suppression of urine (*apis*). Nausea and vomiting with frequent serous, watery or bloody stools (*momordica*). Petechiæ on the extremities.

HYGIENIC AND DIETETIC TREATMENT.

Relapsing fever patients should be kept quiet in bed during the primary paroxysm, and free ventilation secured. The bed and room should be sprinkled with Platt's chlorides, or some other disinfectant. The bed and body linen should be changed daily and thrown into a vessel containing a solution of carbolic acid before being removed from the room, and afterwards washed in boiling water. All unnecessary visiting should be prohibited, and, as a rule, the sick should not be allowed to leave their rooms until the period of relapse shall have passed.

A carefully regulated and *nourishing diet* is of the utmost importance, because deficient alimentation has in the majority of cases been a predisposing cause. From one to two quarts of milk should be administered daily during the paroxysm. Meat broths and light farinaceous food, ice cold koumyss, weak iced tea with lemon-juice, and other cooling drinks may be allowed. Buttermilk is often exceedingly grateful to patients and is highly beneficial.

When the temperature begins to decline and sweats appear, the body should be kept dry, and warm nourishing drinks and warm applications resorted to.

During the intermission as much substantial food as can be digested should be allowed.

Any tendency to heart-failure at the time of the crisis, or early in convalescence, should be obviated by the early use of wine, champagne or spirits. The pulse and the character of the first

sound of the heart are the best guides as to the amount of stimulation necessary.

Excessive tenderness of the spleen and liver may be relieved by the use of fomentations and poultices. The tumefied spleen may be decidedly reduced in volume by means of the induced electric current. With partial suppression of urine at the crisis, flaxseed poultices to the loins are beneficial.

As the patient enters upon convalescence after this blood-infection, pure air and good diet, mental and bodily rest, are especially desirable.

LECTURE XXI.

Small-Pox.

I shall this morning commence the history of the contagious fevers that are specially characterized by an eruption, and hence have been termed *eruptive fevers*. They are five in number, *small-pox* or *variola*, including *varioid*, *varicella* or chicken-pox, *scarlet fever* or *scarlatina*, *measles* or *rubeola*, and *german measles* or *rötheln*.

They are all propagated by a distinct morbid agent, reproduced within the body, and are characterized by a definite period of incubation. They run a clearly defined course, and are attended by active febrile symptoms, and by an eruption which passes through a regular series of changes and then disappears. They are all contagious, and, as a rule, attack the same person but once.

The most remarkable of all the eruptive fevers, and the first of which I shall speak, is small-pox.

Definition.—It may be defined as an acute, highly contagious fever, of from two to four weeks duration, characterized by a pustular inflammation of both the cutaneous and mucous surfaces, accompanied by symptoms of considerable constitutional disturbance. It consists of: 1. An *initial stage*, ushered in by a chill, and marked by anorexia, nausea, vomiting, headache, pain in the small of the back, sore throat, active fever, rapid pulse, and occasionally an initial erythematous rash. 2. A *stage of eruptions* introduced on the third day of the disease by a reddish, millet-seed or pin-head sized eruption, and marked by sudden subsidence of febrile symptoms—the eruption as it develops

becoming dark-red and papular on the fourth day, slightly vesicular on the sixth day, completely vesicular, pea-sized and frequently umbilicated on the seventh or eighth day. 3. A *stage of suppuration* on the eighth or ninth day of the disease, when the pustules are fully formed, secondary fever comes on, the temperature rises as high or even higher than during the initial stage, augmentation of all the symptoms occurs, the face swells, general itching becomes intolerable, and the patient emits a sickly odor. 4. A *stage of desiccation* about the eleventh or twelfth day of the disease, when the pustules burst and crusts or scabs form, the temperature falls, and the appetite returns—the crusts eventually falling, leaving pigmented cicatrices and occasionally pits. After death, constant lesions of the cutaneous surface, lungs, brain, liver, spleen and kidneys are found.

Synonym.—Its common synonym and first name is variola. The term *variola*, the diminutive of *varus*, a pimple, is of monkish origin, but was first applied to this disease by Constantinus Africanus. The term *pock* is of Saxon origin, and signifies a bag or sac. The epithet *small*, was added to it soon after the introduction of the *great pox* (syphilis) into Scotland from America in 1498.

History.—Although small-pox had certainly been known for several centuries before it was described, the earliest clear account of it was given by Gregory, of Tours, in the year 581. Rhazes, an Arabian physician who practiced in Bagdad, gave the first full and scientific description of the disease in 910.

The success of the Saracen arms in Spain and Sicily in the eighth century assisted the spread of small-pox throughout Europe. Traveling westward it reached England about the close of the ninth century.

It raged throughout Europe about the time of the crusades, and visited England again in 1241. Pest-houses were first generally erected at this time for the purpose of checking the disease and of affording assistance to sufferers.

At the close of the fifteenth century it started in the Netherlands and extended to Germany and Sweden.

It was introduced into Mexico—its first appearance on this continent—in 1520, by a negro slave. This epidemic, as is the rule, when diseases first appear in any country, was unusually

severe, and proved alarmingly fatal. According to Spanish historians, in Mexico alone, three and one-half millions of people fell victims to the scourge. In Hayti it carried off all the inhabitants, and in Brazil whole tribes were completely destroyed.

In the seventeenth and eighteenth centuries it prevailed in England and in Europe, and was the greatest scourge of the age. As a proverb of the times expressed it, "from small-pox and love, but few remain free." Small-pox was first definitely separated from measles by Sydenham in 1633.

In 1649, small-pox first occurred in Boston, and afterward reappeared every decade during the century.

In 1721, one-half of the population of Boston was attacked with the disease, and one-thirteenth of those attacked, died.

In 1767, a terribly fatal epidemic raged in Greenland, Siberia and Kamtchatka.

During the sixteen years following 1783, it is stated that one-tenth of the total mortality at Berlin, was due to small-pox.

An epidemic most remarkable for its extensive diffusion, began in Sweden, in 1824—reached England in 1825, spread to France in 1826-27, and ceased in Italy in 1828-29.

Several epidemics occurred at Copenhagen from 1825 to 1835.

In 1838, one hundred and fifty thousand Mandan Indians, a branch of the Sioux located on the Missouri river, died of the disease, leaving only twenty-seven of the tribe, now located at Ft. Clarke. Catlin asserts, that of twelve millions of American Indians, six millions have been destroyed by small-pox.

In the island of Bombay during the five years following 1848, the small-pox deaths among the unprotected were about six per cent of the mortality from all causes, and among the protected (vaccinated) one per cent.

In 1870-71, a terrible epidemic ravaged Europe, and in 1871-72 the disease prevailed to a considerable extent in Philadelphia.

In the winter of 1881-82 it prevailed in New York, Chicago and Quebec, and in several other large cities of this country and Canada.

Few countries have remained exempt from small-pox. At various periods new and destructive epidemics have broken out in all parts of the world. The spread of the disease depends greatly upon the manner in which the eminently protective remedy, *vaccination*, is employed. For, to-day, amongst the unpro-

tected (*non-vaccinated*), small-pox is as destructive and virulent as in the past.

Etiology.—The causes of small-pox are, predisposing and exciting.

1. *The Predisposing Causes.*—*Climate* has no direct influence in producing this disease.

The season of the year exerts very little influence. Epidemics arise and pursue their course irrespective of seasons. The disease is usually more fatal in summer than in winter.

Age exerts some influence as a predisposing cause. The extremes of life are those on which small-pox falls the heaviest. Immunity is reached at no period, and even uterine life does not exclude the danger of infection. The susceptibility is greatest in children from the seventh to the fourteenth year.

Sex, in itself, has no influence.

Occupation, except as it involves actual exposure, does not predispose to small-pox.

Race and *nationality* exert some influence. The negro and Indian races appear to be particularly susceptible. As a rule, they suffer more violently than the white races, even under the same conditions.

Pregnant women are apt to abort or miscarry during the course of small-pox. The foetus usually perishes, occasionally it survives.

Lying-in women are predisposed to the confluent form of the disease, which frequently terminates fatally.

A previous attack, as a rule, extinguishes the susceptibility to the disease. Cases of secondary or recurrent small-pox, however, have been described in all ages from Rhazes down to the present time.

Non-vaccination exerts a powerful influence. A system unprotected by successful vaccination is strongly predisposed to small-pox.

2. *The Exciting Cause.*—Small-pox is pre-eminently contagious, and is due to a specific poison, communicable from the sick to the healthy by actual contact (upon mucous or abraded surfaces) through the atmosphere, by fomites, and by drinking water. The exact nature of this poison remains as yet unknown, although many writers assert its parasitic origin. It is developed and reproduced in the body of a small-pox patient, first takes

effect upon the patient himself and is present in the blood and in the contents of the pustule.

The disease is constantly communicable from the sick to the well by actual contact of the virus taken from a small-pox pustule, with the mucous membrane or with an abrasion of the cutaneous surface. It is also communicable from one individual to another by means of the expired air, and the cutaneous exhalations. The distance to which it may be thus conveyed, in the open air, is about two and one-half feet. In a small and imperfectly aired apartment the atmosphere may become so impregnated with the infecting principle that a predisposed person will become infected upon a single entrance into the apartment. In large and spacious rooms and in the open air, the danger of contagion is greatly decreased.

The breath of a small-pox patient frequently conveys, and his *body emits*, especially after the inauguration of the suppurative stage, a *characteristic, sickly odor*. It has been thought that a patient in whom this odor is strongly marked, is most likely to communicate the disease.

Besides impregnating his immediate atmosphere, the patient imparts the contagion to all articles with which he comes in contact. In this way not only the clothing and bedding of the patient, and the clothes of his attendants, but also the apartment in which he has lain may act as *fomites*. Woolly substances are especially apt to absorb and retain the contagion, which under favorable circumstances may retain its virulence a year or longer. Exposure to the atmospheric air sooner or later destroys it.

The period at which a small-pox patient is most likely to spread the infection is the period of suppuration. Infection may, however, take place during any stage, even during the period of incubation.

Small-pox may be contracted by susceptible persons through contact with bodies of persons who have died of it. There is no evidence that it can be conveyed by the discharges from the bowels.

The *period of incubation* varies from ten to thirteen days.

Varieties.—The common and well-recognized varieties of small-pox are: 1. *Distinct or moderate* small-pox, in which the pustules remain separate from each other during the whole course of the disease; rarely fatal. 2. *Confluent* small-pox in

which the pustules run together on the face or all over the body; dangerous to life. 3. *Hæmorrhagic* small-pox in which there is a bruised appearance from extensive capillary hemorrhages; usually fatal on the third day.

Clinical History.—The clinical history embraces a description of the period of incubation, the initial stage, the stage of eruptions, the stage of suppuration and the stage of desiccation.

The *period of incubation*, or the time elapsing between the reception of the poison and the onset of the disease, varies from ten to thirteen days. If the poison is introduced into the system through inoculation, the duration of this period is shortened to two days.

Stage of Initial Fever.—Upon the termination of the period of incubation—usually twelve days after the exposure—the attack is ushered in by a feeling of chilliness which frequently increases to a distinct chill, with severe and characteristic *pains in the loins*, accompanied with frontal headache, and soon followed by high febrile excitement. The pulse is commonly full and frequent, rising to 100 or 120, or even to 140 per minute; in children it may reach 160. The temperature rises rapidly, and may reach 104° Fahr. on the first day, 105° Fahr. on the second day, and 106° Fahr. or 107° Fahr. or even higher on the third day. The patient is languid and weak in proportion to the severity of the fever. Not infrequently within twenty-four hours after the ushering-in chill, the infected individual, strong and vigorous in health, will be unable to get out of bed.

The skin feels hot and dry, or else is covered with a moderate perspiration. The face is flushed, the conjunctivæ are injected, and there is throbbing of the carotids. The tongue is red at the tip and edges, and there is nausea and vomiting with epigastric pain and obstinate constipation. There is soreness of the throat with pain in the pharynx and more or less difficulty in swallowing. The respirations are short, frequent and labored. Towards evening, on the second or third day, there may be delirium; in children delirium and convulsions may occur at the onset of the attack.

Swelling and diffuse redness of the tonsils and soft palate are usually apparent at the close of the second day, and occasionally minute reddish papules may be recognized upon these parts. At times, especially in children, and in women during menstruation

and confinement, a bright or dull crimson, *erythematous* rash appears, oftenest about the groins, hypogastrium and inner surface of the thighs. Less frequently it is observed about the axillæ, the exterior surfaces of the joints, and the lumbar and clavicular regions. It appears mostly about the second day, and lasts about twenty-four hours, fading almost completely as the characteristic variolous eruption appears.

Stage of Eruptions.—On the third day of the disease—sometimes earlier in severe and confluent cases—an eruption appears upon the face, especially along the edges of the hair, in the form of small, red, elevated papules, resembling measles. These little points which rapidly increase in numbers, soon cover the forehead, nose and upper lip, and extending within twelve hours to the neck, arms, trunk and lower extremities, cover the entire body. Their site is usually around a hair-follicle or the orifice of sebaceous or sweat glands. They are frequently arranged in three's and five's in a crescentic shape, two crescents often coming together to form a circle. They are at first millet-seed or pin-head sized, and are of a pale red color, resembling flea-bites. Soon they become conical and hard, and feel almost like shot underneath the skin. They gradually increase in size, and on the third day of the eruption a minute vesicular point is formed at their apex. This conversion of papules into vesicles occurs first on the face, and then on the neck, trunk and extremities. Within the next two days the vesicles enlarge to the size of a small pea, and become indented or umbilicated. They are nearly hemispherical, and are surrounded by small, inflamed areolæ. Their contents, which are at first transparent, become whitish and milky. The umbilication of the vesicle is characteristic, although all vesicles are not umbilicated. On or about the second day of the eruption the red elevations which appear on the buccal mucous membrane simultaneously with or previous to the eruption on the skin, assume the appearance of small, whitish, circular umbilicated points.

As the eruption appears, the febrile symptoms subside, the pains in the head and back vanish, the temperature falls two or three degrees, and the pulse is diminished in frequency.

Stage of Suppuration.—On or about the sixth day of the eruption, and the ninth day of the disease, the vesicles gradually become turbid from the admixture of pus corpuscles. Within

the next two days the pustules become fully formed, maturing first on the face and upper part of the body, and lastly on the extremities. With the process of suppuration, a new fever to which the term *secondary* or *suppurative fever* is applied, makes its appearance either alone or preceded by a distinct chill, and lasts between four and six days. The temperature rapidly rises to 103° Fahr. or 104° Fahr.; and sometimes to 108° Fahr. or 109° Fahr. at the height of suppuration. The pulse becomes hard and full, and fluctuates between 100 and 140 beats per minute. The headache returns, and passive delirium not infrequently occurs. The face and eyelids swell, so that the features are no longer to be recognized. The skin becomes tense, hot and dry, and emits a characteristic foetid, sickly odor. In the vicinity of the pustules it becomes red, tumefied and painful; each pustule being surrounded by a hard, broad, red areola. The itching now becomes intense. The swelling and soreness of the throat increases, and swallowing becomes painful and often impossible. Salivation is frequently a prominent symptom. About the eighth or ninth day the pustule attains its full size, and the stage of suppuration is complete.

Stage of Desiccation.—The retrograde changes in the pustules begin on the face, and extend in from two to four days to the extremities. These changes are marked in some of the pustules by the formation of a brown spot in the center, which gradually extends and converts the pustule into a hard crust. In others the changes are announced by the rupture of the pustules, the consequent discharge of their contents, and the formation of yellow scabs. Some pustules do not form scabs, but shrink away in consequence of the absorption of their fluid contents.

As desiccation commences the areolæ around the bases of the pustules become less inflamed, and the puffiness of the face disappears. The secondary fever subsides, the temperature of the integuments decreases, and the pulse diminishes in frequency. The urine, which has been scanty, high-colored and perhaps albuminous, now becomes normal.

The *drying of the pustules* is usually completed in from four to seven days.

The scabs fall off between the eleventh and sixteenth days. In some instances they leave blotches of a reddish-brown color, which remain visible for five or six weeks, and then disappear

leaving no cicatrices. In other cases, usually severe, in consequence of ulceration and destruction of the cutis, little, dead-white, cicatricial "pits" or depressions are formed, which remain during life, and give to the face a "pock-marked" appearance.

During convalescence small abscesses frequently form on the thighs and legs.

The *desquamation* or *falling of the crusts* ends somewhere between the nineteenth and twenty-fifth, and even the fortieth days of the eruption.

We will now pass on to the consideration of the *confluent variety* of the disease.

Confluent Small-pox.—This variety of small-pox is much more severe than the one we have just been considering. The stage of initial fever is frequently shortened to forty-eight hours. The temperature often reaches 106° Fahr. and in severe types may rise to 110° Fahr. The skin appears inflamed and becomes swollen and of darkish hue. On the second day numerous red papules seated on a red and swollen skin appear and cover all parts of the body. The eruption is frequently dark and livid, and petechiæ are not uncommon. The vesicles as they form increase the violence of the cutaneous inflammation and are so crowded on the surface that their edges run together. The pustules rapidly follow the vesicles, and tend to coalesce into large flat blebs.

After the appearance of the eruption the temperature falls slowly to 103° Fahr. or 104° Fahr. With suppuration it again rises as high, and in some cases even higher than during the initial stage.

The secondary fever is much more dangerous than in the distinct or moderate variety, and rapidly assumes a typhoid character.

The eruption extends to the mucous lining of the respiratory tract in severe cases. The tongue becomes swollen and there is great difficulty in swallowing. Pharyngo-laryngitis not infrequently occurs. Violent and persistent vomiting and obstinate diarrhea often appear with the initial fever and continue throughout the disease. Hemorrhage may take place from the mucous surfaces of the alimentary canal and urinary tract. Violent delirium is of common occurrence, and not infrequently passes quite suddenly into a state of coma. In the majority of cases

albumen appears temporarily in the urine. Bronchitis, pneumonia, pericarditis, pleuritis and acute fatty degeneration of the kidneys, are frequent complications.

In the stage of desiccation large concentric crusts are formed over the confluent patches, while suppuration of the papillary layer is going on beneath. After the crusts have fallen, as the cutis is more or less extensively destroyed, ugly pits remain, often producing permanent and unsightly disfigurements. Permanent loss of hair not infrequently occurs.

A much more formidable but fortunately rarer variety than either of the preceding varieties of small-pox, is the *malignant* or *hemorrhagic*.

Hemorrhagic Small-Pox.—*Hemorrhagic* or *black small-pox* is extremely rare, although cases occur in every epidemic. The ushering-in symptoms are occasionally but little different from those of the preceding varieties, although the lumbar pain is apt to be severe. Frequently the initial fever is extremely violent, while during the rest of the time the temperature may not exceed 102° Fahr. The pulse is exceedingly frequent and feeble from the start, and ranges from 140 to 160 beats per minute.

The characteristic papules may be preceded by a petechial or roseolous rash, and early in the disease the eruption assumes a dark color. In the majority of cases the hemorrhagic changes begin in the papules situated upon the lower extremities. The vesicles as they form instead of filling with lymph, contain only a thin, sanguinolent fluid. They are irregular in shape, and flabby. They mature imperfectly or not at all, and seldom reach the suppurative stage. Petechiæ and ecchymoses form between the eruptive points. As the vesicles or pocks break or are ruptured, dark scabs are formed.

The cutaneous surface frequently presents a dark, purplish hue, from extensive capillary hemorrhages. The face is swollen, the eyelids are thick and œdematous, the conjunctivæ are blood-colored, the skin is ecchymotic and the entire features are obliterated. The tongue is thickly covered with a white fur, and white pustules may be seen on the fauces and palate. Hemorrhage from the mucous surfaces not infrequently occurs. The mind is sometimes clear, delirium is common, and typhoid stupor may exist.

Death generally occurs on the third or fourth day; occasionally it happens before the appearance of the rash. It may take place from shock, coma, hemorrhagic infarctions of the lungs, or rapid exhaustion.

Complications.—The most important complications of small-pox are, inflammations of the serous membranes, subcutaneous abscesses, conjunctivitis, otitis, bronchitis, pneumonia, acute fatty degeneration of the kidneys, lesions of the intestinal canal, articular inflammations and different hemorrhages.

Duration.—The length of time that elapses between the beginning of the initial fever and the termination of desquamation, varies from three to four or even six weeks.

ANALYSIS OF CHART.

The Nervous System. - *Chilliness* increasing to a *distinct chill* is in the majority of cases the ushering-in symptom of small-pox.

Headache is one of the earlier and more constant attendants. It is commonly confined to the frontal region, but may extend over the entire head.

Vertigo is often associated with the headache.

Delirium is an occasional symptom. It is apt to occur in severe cases, and is generally passive in character. Occasionally it is active or maniacal.

Coma occurs in certain proportion of fatal cases.

Pains in the back and extremities are prominent diagnostic symptoms. They are apt to be intense in proportion to the severity of the attack.

Convulsions frequently attend the development of the disease in children.

The Special Senses.—*The Eyes.*—Conjunctival injection is generally present. In the hemorrhagic variety the conjunctiva is blood-colored and oedematous. Pustules sometimes form upon the conjunctiva of the lids, and more rarely upon that of the globe or upon the mucous membrane of the lachrymal tract. Keratitis, and, in severe cases, deep ulceration of the cornea are not infrequently observed. Retinal hemorrhages occasionally occur in hemorrhagic cases.

Impairment of hearing, and even *complete deafness*, not un-

CHART XIV.—*Small-Pox.*

Nature:	Highly contagious.					Portable.				
Incubation:	Ten to thirteen days.									
Stages	Initial Fever		Eruptions.		Suppuration.		Desiccation.			
Duration:	Three days.		Five to six days.		3 to 5 days.		10 days to 2 weeks			
Eruption:	Roseola variolosa, occasionally on second day		1st D	3d D	4th, 6th d	Pustules pea-sized. Mature and rupture.		Scabs. Crusts. Scales.		
Papular.			Vesicular.	Pustular.						
			Umbilicated							
			First on face							
Temperature	1st D	2d D	3d D	Falls 2° or 3°			105° to 108° Secondary fever		Gradual decline.	
	104°	105	106 to 107°							
Pulse:	100 to 140 Full frequent			75 to 100			100 to 160. Hard and full		SUSSEQUENCE OF SYMPTOMS	
Nervous System:	Chilliness. Vertigo. Frontal headache <i>Pain in loins</i>			AMELIORATION OF SYMPTOMS.			Headache. Delirium. Coma			
Tongue:	Red, at tip and edges						Thick, white coating Salivation			
Digestive Tract:	Nausea. Vomiting. Abdominal pains Constipation.						Constipation. Occasionally diarrhoea.			
Respiration.	Labored						Short & labored			
Urine:	Scanty. High-colored.						Albuminous Casts.		Profuse. Pale.	
Throat:	Sore throat			Reddish points. Inflamed. Dysphagia.			Whitish points Highly inflamed Dysphagia.		Returns to normal	
Skin:	Perspiration.			Inflamed areolæ. Swollen. Sickly odor.			Tumefaction Sickly odor		Reddish-brown blotches. Cicatrices	
Eyes:	Congested.			Conjunctivitis			Keratitis. Edema.		Recovery.	
Varieties:	Distinct.			Confluent.			Hemorrhagic.			
Mortality:	Distinct, 2 to 3 percent.			Confluent, 50 per cent. Hemorrhagic, always fatal						
Prophylactic:	Vaccination, successfully performed.									

commonly result from sténosis of the Eustachian tubes and catarrh of the middle ear, consequent upon tumidity and purulent infiltration of the epithelium.

The Temperature.—The fever in small-pox is of the relapsing type. The temperature in the initial fever rises rapidly in an unbroken line to 104° Fahr. on the first day. During the second day it may rise to 105° Fahr., and by the third day it may reach 106° Fahr. or even 107° Fahr. After the papules appear the temperature falls more or less rapidly, from the second to the sixth day of the eruptive period. Occasionally it reaches the normal, but generally it remains sub-febrile. During the suppurative fever it rises again to a height commensurate with the severity of the case. In confluent cases the secondary fever is marked by higher temperature and more active delirium than in distinct or moderate forms.

In non-fatal cases the secondary fever lasts about a week, or until many of the pustules burst or dry into scabs and crusts, and defervesces by gradual lysis.

The Pulse.—The pulse is increased in frequency during the initial fever, and ranges from 100 to 140 beats per minute. It diminishes fifteen or twenty beats during the eruptive stage, but rises again to 120 or 140, or even 160 during the suppurative stage. With defervescence it slowly returns to the normal.

In severe confluent cases the heart-sounds are sometimes feeble and obscure, and the heart's action irregular and intermittent.

Pericarditis occasionally occurs in conjunction with pleurisy. Ulcerative endocarditis is rare.

The Respiratory System.—The respiratory movements are generally accelerated, and dyspnœa is often marked. Bronchitis is common in all well-marked cases. Catarrhal pneumonia may supervene upon bronchitis, and in persons predisposed to it, phthisis may be developed. Croupous pneumonia may occur during any period of the eruptive stage. Pleurisy setting in suddenly, and displaying a tendency to result in empyema, is not uncommon after the twelfth day in severe cases.

The Eruption.—The eruption of small-pox appears, as a rule, on the third day, exceptionally it is met with as early as the second or not discovered until as late as the fifth, sixth, or even the

seventh day. It is characteristic of the disease, and is first seen upon the face, especially along the edges of the hair and about the chin and mouth. It soon extends to the neck, trunk and extremities, and within twenty-four or forty-eight hours the entire body may be more or less covered by it. In young children it is often first observed upon the genitals.

An intimate relation exists between the abundance of the eruption and the severity of the disease. A copious eruption, deep in color, and early becoming livid or petechial, indicates, as a rule, a severe attack. Sometimes a roseolous rash resembling measles precedes the characteristic eruption. In confluent cases the eruption is dark and livid, and petechiæ are common.

The course of the small-pox eruption is as follows: At first the lesion consists of small, isolated and rounded *specks*, which soon become converted into papules. The *papules* are of a vivid red color, and measure from a third to two-thirds of a line in diameter. They are hard and feel like shot under the skin, and are frequently arranged in three's and five's in a crescentic manner. In hemorrhagic cases bright-red petechiæ occur upon the skin, coincident with the appearance of the papules. On the third day of the eruption the papules become conical in shape, and the apex of each pimple becomes vesicular, and gradually as the whole pimple takes this character, the apex becomes depressed, till on the fourth or fifth day of the eruption an *umbilicated vesicle* is formed, containing a clear fluid and surrounded by a narrow, rosy areola. In confluent cases the vesicles as they form upon the papules, so crowd the surface as to run together, and, instead of serum, often contain a thin, brownish, ichorous fluid. In hemorrhagic cases they fill with a thin, sanguinolent fluid, instead of serum, and remain flat and flabby.

The contents of the *vesicle*, which are at first transparent, gradually become whitish and milky, and by the sixth or seventh day they appear as pus—the vesicle is now transformed into a pustule. This process begins, as in all the metamorphoses of the disease, in vesicles of greatest age, those namely on the face and upper part of the body. As a general rule, the pocks are most numerous on the face, and next on the neck and limbs.

The *pustules* enlarge until they attain the size of a pea, and the umbilication becomes lost. Their bases become hard and more or less broadened, and the whole of the skin, especially

about the face, becomes red and tumefied. About the eighth or ninth day of the eruption the pustules either break and discharge their contents, which harden into yellowish and ultimately brownish, irregular crusts, or else the entire envelope and contents desiccate and form brownish scabs.

After a variable period of from a few days to five or six weeks, the *crusts* fall and leave a depressed, reddish-brown stain, which in time (five or six weeks) disappear. If there has been much destruction of the cutis, whitish depressed *scars* called "pits" are formed, and the skin presents a "pock-marked" appearance.

The Throat.—An eruption appears upon the pharyngeal, buccal, nasal, conjunctival and genital mucous membranes, simultaneously with or slightly preceding the eruption on the skin. It begins with more or less vivid redness of the mucous membrane, followed by development of little red elevations. On the second or third day these red elevations assume the appearance of whitish, rounded points, which last generally about five days.

Soon after the appearance of pustules in the mouth and throat, a true inflammation of the parts, as indicated by more or less sore throat and difficulty in swallowing, with swelling and tenderness of sub-maxillary glands, sets in. Occasionally if the eruption extends to the larynx there is laryngeal distress and hoarseness.

The Skin.—After the appearance of the eruption the skin becomes tense, red and shining, and there is more or less inflammation and swelling of the sub-cutaneous cellular tissue. The swelling is greatest upon the face, where it commences about the fourth or fifth day of the eruption, increases for five or six days and then gradually diminishes as desiccation begins. In severe confluent cases the skin becomes thickened, swollen and hard, and assumes a darkish tint. And in hemorrhagic cases the face is swollen, purple or black, and bloody extravasations, which frequently dissect the cuticle from the skin, take place beneath the eruptive points.

The physiognomy of a person ill with small-pox is somewhat peculiar. The tumid and closed lids, and the oedematous face thickly covered with pustules, render the features absolutely indistinguishable.

The Digestive Tract.—The *tongue* is generally moist and

more or less furred, and is red at the tip and edges. In confluent cases it is frequently enlarged.

The *appetite* is, as a rule, lost during the course of the fever. Sometimes it returns temporarily during the stage of eruptions.

Thirst is commonly present, and is acute in proportion to the violence of the fever.

Nausea and *vomiting* occur in the early stages, and are apt to be prominent symptoms.

Dysphagia occurs in most cases, and is usually most marked in confluent cases.

Constipation is very common in small-pox, and generally continues throughout the disease. A slight diarrhea occasionally makes its appearance about the end of the first or second week. A severe diarrhea is almost always the sign of a dangerous complication. Colicky pains referred to the epigastric region are often complained of.

The Urine.—The urine is diminished in quantity during the initial fever. After the secondary fever it is increased in quantity and of low specific gravity. Its color is at first darker than in health; during desiccation it is pale. Urea and uric acid are increased, and the chlorides are gradually diminished. In many cases albumen and tube-casts are present. Hæmaturia is occasionally encountered, and is always a grave symptom. It is commonly associated with other hemorrhages.

The Genital Organs.—In non-pregnant females *premature menstruation* is apt to occur.

In pregnant women there is a great tendency to *abort*, especially in the latter months of pregnancy.

In men *variolous orchitis* is not uncommon.

LECTURE XXII.

Small-Pox.—(CONTINUED.)

At my last lecture I spoke of the nature, causation and course of *small-pox*. To-day I propose to complete its history by considering its anatomical changes, differential diagnosis and treatment.

Morbid Anatomy.—The characteristic lesion of small-pox is the inflammation of the skin and mucous membrane constituting the *eruption*.

The red spot which is the first step in the development of the eruption, is due to localized hyperæmia of the papillary body. Soon the papillæ, which are the seat of the congestion, become surrounded with cells, usually of larger size than those of normal tissue. Most of these cells are swollen epithelia from the rete, that have undergone coarse granulation as a result of the hyperæmia. The chief collections of these elements are seated mostly in the neighborhood of a hair follicle or sweat gland. As they accumulate they elevate the epidermis, and a little papule appears at the point of redness. The papules which are formed at the red spot are thus due mainly to the changes in the rete Malpighii and in the capillaries.

Following these changes an exudation, in which there are suspended delicate granules of coagulated albumen, and irregular threads of coagulated fibrin, makes its appearance in an irregular cavity in the midst of the greatly widened rete, resulting from destruction of the epithelia. As the exudation increases, a little vesicle is formed upon the summit of the papule.

Frequently within a brief period after the first appearance of

the vesicle, its center becomes depressed. This depression or *umbilication* is supposed to be due to the more rapid swelling of the peripheral cells. It is not observed in every vesicle, and disappears, as a rule, at the stage of suppuration.

As soon as the vesicles are fully formed, pus-corpuscles, arising by endogenous formation from the epithelia traversing and bounding the cavity formed in the rete, appear. The vesicles are now changed to pustules. In healthy individuals the pus is thick and yellow, and the pus-corpuscles appear coarsely granular; while in weakly, scrofulous persons the pus is watery and pale, and the pus-corpuscles are finely granular.

The pustules as soon as they have matured, either burst or their contents dry, and form crusts. During desiccation on account of the drying of the center, before the periphery of the pustule, a depression known as the umbilication of desiccation, often forms, at times in pocks previously non-umbilicated. If the suppuration has been the result solely of the destruction of the epithelia, no scar will be formed. But if a part of the connective tissue has been transformed into pus, the result will be a cicatrix and pitting.

The pigmentation of the skin which remains after the scabs have fallen, is due to imbibition of the coloring matter of the red blood-corpuscles which have transuded from the capillary loops in the papillæ.

On the mucous membrane the eruption is thickest and deepest in the respiratory tracts.

The blood is of a dark color and deficient in fibrin.

Congestion and parenchymatous changes, consisting of granular or fatty infiltration of the internal organs are frequently observed.

Extravasations of blood are found in almost all of the viscera, and in the skin and mucous membrane, in hemorrhagic cases.

Differential Diagnosis.—The diagnosis of small-pox should be made out as early as possible, so that persons in contact with the patient may be vaccinated or re-vaccinated in time to prevent the diffusion of the disease. To be effective vaccination must be performed in time to reach the stage of *arœla*—from seven to nine days—before any illness from small-pox occurs.

As a rule, the diagnosis cannot be made with certainty previous to the stage of eruption, and even then there is a possibility

of mistake. Generally, your safest course will be not to commit yourselves to a positive diagnosis until the vesicles are fully formed, up to which time there is but little danger from infection.

The principal diagnostic points are: the prominence of lumbar pains and vomiting, the remission or cessation of fever as the eruption appears, the appearance of the eruption on the third day and first upon the forehead along the margin of the hair, the granular, hard, shotty papules, the umbilication of the vesicles, and the round, whitish or ashy spots on the throat and mouth.

In the initial stage it is possible to mistake small-pox for typhus fever or meningitis. And during the first forty-eight hours the roseolous rash if present may be mistaken for scarlet fever or roséola. On the third day, when the papular rash is appearing, it may be mistaken for either measles, german measles or acne. At a later stage when the vesicles form it is possible to mistake it for varicella or chicken-pox.

Typhus fever can be easily differentiated from small-pox after the advent of the eruption. In small-pox the eruption makes its appearance upon the third day, while in typhus it does not appear until the fifth day, and is first seen upon the abdomen.

Meningitis often simulates small-pox in the initial stage, as both diseases have photophobia, intense headache, nausea and vomiting occurring as prominent symptoms. In meningitis, however, the face is generally pale and anxious, while in small-pox it is flushed. The advent of the eruption will always dispel any doubt as to the correct diagnosis.

Acne is always distinguished by the absence of the special constitutional symptoms of small-pox.

Measles may be differentiated from small-pox by the early presence of catarrhal symptoms and by the absence of well-marked lumbar pain. The papules appear on the third day in small-pox and are, small, hard and distinct. They appear on the fourth day in measles, and are larger and flatter, and soon run together in crescentic outlines. In small-pox the temperature falls as the stage of eruption is reached, while in measles it continues to rise as the eruption appears.

Varicella or *chicken-pox* differs from small-pox in the almost complete absence of prodromes and in the rapid course of the

eruption. The rash appears on the second day, shows itself at once upon the face and trunk, and in a few hours becomes vesicular. The vesicles are usually small, oval and remarkably transparent, and are apt to appear in successive crops.

Prognosis.—The prognosis will depend largely upon the amount of the rash, for other things being equal, *the more abundant the eruption, the greater the danger.*

The distinct variety is not usually fatal unless some complication arises, the mortality being about two or three per cent among the non-vaccinated. In semi-confluent small-pox the mortality is about six per cent. In the confluent variety nearly one-half of the cases die. The hemorrhagic form is always fatal.

The prognosis is greatly influenced by age. In early infancy and in old age, the ratio of mortality reaches its maximum. In intemperate people and in the over-worked and badly nourished, the prognosis is bad. Women, pregnant or in the puerperal state, and all persons unprotected by previous vaccination, run great risk when taken ill with small-pox. As in other epidemics, the mortality is greatest at the beginning and height of the epidemic, and gradually declines as the latter draws to a close. Small-pox is, as a rule, more fatal in summer than in winter.

Death is sometimes attributable to the intensity of the fever.

Usually, if death occurs before the suppurative stage is reached, it is due to some complication involving, in the majority of cases, the throat and air passages.

When not attributable to complications, a fatal termination is generally due to inability of the powers of the system to withstand the depressing influence of the suppurative process. If death does not occur until the second week, it is oftenest due to exhaustion.

The most dangerous complication of small-pox at the suppurative stage, is acute fatty degeneration of the kidneys.

Unfavorable prognostics are, occurrence of the disease at the extremes of life, violent nervous symptoms during the initial stage, *abundance of eruption*, continuation of fever after appearance of eruption, occurrence of petechiæ and local hemorrhages, cessation of salivation, typhoid delirium and other ataxic symptoms.

Treatment.—*Prophylaxis.*—The preventive treatment of

small-pox consists in *vaccination*, properly performed, and of which I shall speak at my next lecture. Should your patient consult you too late to expect results from vaccination, you may administer either *malandrinum* or *vaccinium* internally as a prophylactic, usually with marked success. Drs. Raue and Straube speak highly of the effect of *malandrinum* in the Philadelphia epidemic of 1880-81, and Drs. Kaczkowsky, Landell, Hughes and others concur in testifying to the great value of *vaccinium*. Baptisia, hydrastis, tartar emetic, sarracenia, cimicifuga and sulphur, each and all have advocates of their prophylactic virtues in small-pox.

To prevent the spread of the disease, every small-pox* patient, unless he can be *thoroughly isolated* at home, should be compelled to go to the municipal small-pox hospital. Every city and large town should have its small-pox hospital—built after the barrack system—particularly when the disease is prevailing as an epidemic.

Every one in the house with the sick person should be vaccinated or re-vaccinated. The patient should be removed to an upper room, as far from other living and sleeping rooms as possible, and absolutely no one should have access to him or her, except the physician and the nurse. The sick room should be *large*—not less than fifteen hundred cubic feet—and *well ventilated*, and the temperature should be kept below 60° Fahr. All unnecessary furniture, and all curtains and hangings which are liable to interfere with ventilation or retain the contagion should be removed from the room. Sheets should be hung up in the door and window ways, which should be kept constantly saturated with Platt's chlorides or some disinfecting solution. Absolutely no intercourse should be had by the nurse with the members of the family and the outside world, until all danger of contagion has passed.

Inmates of the house during the continuance of the disease, should refrain from visiting any school, church, theatre or other place of public assemblage. All letters before being sent from the house should be put in an oven and subjected to a temperature of not less than 250° Fahr.

* All cases of small-pox occurring in the county, must be reported to the County Clerk; or, in cities, to the City Board of Health.

When attending a small-pox case, before entering the sick room, you should remove your overcoat and put on a rubber coat, which must be sponged with a weak carbolic acid solution, and hung up in another room on leaving the apartment. Before visiting your next patient it would be well to take a short drive in the open air.

Platt's chlorides or a potassium cyanide solution (ten grains to the ounce of water), should be sprinkled upon the bed and about the room.

All discharges from the nose and mouth should be received on cloths and immediately burned.. The urine and fæces, and any scabs that may fall from the body, should be received in vessels partly filled with either a five per cent solution of carbolic acid or some other disinfectant, and afterwards buried a sufficient distance from the water supply. All bed and body linen should be thoroughly washed in a disinfecting solution before being removed from the room, and afterwards *baked*.

After recovery the patient should be bathed in Platt's chlorides solution, or in a weak solution of chloride of zinc—one part to three hundred—and fresh clean clothing put on. And at least two weeks should elapse after desquamation has taken place, before he may be allowed to again enjoy the society of his family and friends. In the event of death the clothing of the deceased should be sprinkled with strong carbolic acid; the body placed in an air-tight coffin, and privately interred, as early as possible.

After recovery or death, the apartment should be fumigated by burning sulphur, thoroughly aired, cleansed and whitewashed. The bedding, all articles worn by the patient, and all the wearing apparel used by the nurse, should be either *baked* or if possible immersed in some disinfecting fluid and then *thoroughly boiled*. The mattress and pillows should be burned.

Principal Remedies.—*Baptisia*, *belladonna* and *veratrum vir.* are oftenest indicated in the initial stage; *vaccinium*, *malandrinum*, *tartar emet.* and *thuja* in the stage of eruptions; *mercurius*, *malandrinum* and *lachesis* in the suppurative stage; and *sulphur* in the stage of desiccation.

Baptisia will be needed during the initial fever when there is considerable prostration, and an early tendency to decomposition. *Veratrum vir.* is called for when the fever is intense, the pain

in the back is severe, and the pulse is very rapid. *Cimicifuga* should be thought of when the headache and backache are severe, and there is nausea and restlessness. *Belladonna* will be of service when the head and throat symptoms are severe, and there is a tendency to delirium.

Tartar emet. is specially valuable during the eruptive stage. It is also of service during the stage of initial fever, if nausea and vomiting are very troublesome. After *bryonia*, it is the remedy for early bronchitis. *Mercurius* will have a favorable effect upon the suppurative process, if administered as soon as the secondary fever appears. It is always indicated when such symptoms as salivation, ulcerated sore throat, foetid breath and bloody diarrhea are present. *Arsenicum iodide* is preferable to either *mercurius* or *tartar emet.*, after the pustules are formed, and there is a tendency to putrid decomposition. *Apis* will be of service when there is excessive swelling of the face with troublesome itching, and when either oedema of the glottis or nephritis threatens. *Camphor*, if the eruption suddenly disappears or suddenly becomes malignant. *Lachesis* or *rhus tox.*, if a typhoid condition attains during the suppurative stage. *Muriatic acid* or *variolinum* for malignant throat symptoms. *Hepar sulph.* for croupous laryngeal symptoms during the suppurative stage, and for boils during the stage of desiccation. *Mercurius cor.* for the ophthalmia, and after *apis* for the parenchymatous nephritis. *Bryonia* and *kali bich.* for bronchitis. *Phosphorus* or *tartar emet.* for pneumonic complications. *Sulphur* when there is furious itching during desquamation. *Kali sulph.* to hasten the removal of the scabs. *Cinchona* for excessive debility and prostration after a severe attack.

Malandrinum, *tartar emet.*, *arsenicum* and *phos. acid* are oftenest used in confluent cases. *Crotalus*, *ammonium carb.* and *lachesis* are the remedies most frequently administered in the hemorrhagic variety.

Leading Indications.—The guiding symptoms for the different remedies may be compiled as follows:

Ammonium carb.—Hemorrhagic tendency. Putrid sore throat (*mur. acid*). Dyspnoea from retrocession of eruption. Adynamia.

Apis mel.—High fever with chilliness from the slightest

movement. Erysipelatous redness and swelling with stinging, burning pains in skin and throat. Dry ulcers on the tonsils and palate. Nausea and vomiting with soreness of the pit of the stomach on pressure (*bry.*). Suppression of urine (*hyos., opium*); albuminuria (*phos. acid*). Dyspnoea with great restlessness and trembling (*ars. alb.*)

Arsenicum.—Great sinking of strength (*verat. alb.*) with burning heat and extreme restlessness (*camphor*). Frequent, small, trembling pulse. Irregular action of the heart, absence of the second sound. Tongue red, dry and cracked. Dryness of the mouth with violent thirst, drinks often, but little at a time (*bell., opp. bry.*). The eruption is intermixed with petechiæ (*rhus*). The pustules sink in and their areolæ grow livid (*lach.*). Mild delirium with convulsive twitchings of the tendons. Dyspnoea, constantly changing position. Violent diarrhea. Typhoid symptoms.

Baptisia.—Dull, stupefying headache (*gels.*). Nausea followed by vomiting. Great prostration with excessive pain in the lower part of the back. The eruption is more marked in the throat than upon the skin. Fætid breath with profuse salivation (*merc.*). Dark, red face with besotted expression. Dyspnoea and great nervous restlessness. Dysenteric stools. Offensive secretions.

Belladonna.—High fever and sore throat. Severe head symptoms with delirium. Eyeballs red and injected with intolerance of light. Pain in the back as if it would break. Throbbing of the carotids (*gels.*). Intense swelling of the skin and mucous membrane (*apis*). Violent tonsillitis with stitching pain. Difficult deglutition; fluids swallowed return through the nose (*kali bich., lach.*). Dry, spasmodic cough, worse at night (*hyos.*). Involuntary micturition and defecation. Jerking of the bedclothes. Starts as if in affright on awaking or during sleep (*ars.*).

Bryonia.—Great prostration with coldness or mixed chill and heat. Stitches, soreness and dry feeling in the throat. Extreme sensitiveness of the epigastrium to the touch (*apis*). Nausea and faintness on rising. Restless sleep with moaning and with chewing motions (*bell.*). Obstinate constipation. Chest symptoms.

Camphor.—Sudden and great sinking of strength with coldness of the surface (*ars.*). Sudden collapse from exhaustion of the vital forces (*verat. alb.*). The eruption suddenly disappears and the pustules appear to dry up rapidly. Dyspnoea with sensation of constriction around the throat with hot breath. Small, weak, scarcely perceptible pulse (*carbo. veg.*). Rattling in the throat; involuntary evacuations.

Cantharis.—The eruption assumes the hemorrhagic form. Tonsillitis with inability to swallow. Thirst with aversion to all fluids (*bell.*). Dysuria and bloody urine. Albuminous urine with cylindrical casts (*terebinthina*). Hemorrhages from the nose, mouth, intestinal canal, urinary and genital organs.

Carbo. veg.—Coldness of the breath and tongue (*verat. alb.*). Excessive prostration (*ars.*). Internal burning, wants to be fanned (*ars.*). Livid, purple appearance of eruption (*lach.*). Rattling in the throat with complete loss of vital power. Thread-like, scarcely perceptible pulse. Ecchymoses.

Cimicifuga.—Dull, heavy, aching pain in the small of the back, relieved by rest, increased by motion (*bry.*). Great muscular soreness (*arn., bry.*). Pricking, itching heat of the skin. Severe pain in the head and eyeballs, aggravated by motion (*bry.*). Redness of the fauces and palate. Obstinate sleeplessness (*coff., opium*). Delirium resembling delirium tremens (*digit.*).

Gelsemium.—Great exhaustion and drowsiness. Feeling as of a band around the head above the ears (*merc.*). Itching of the head, face and neck. Nausea and vomiting with weak, scarcely perceptible pulse. Trembling and complete loss of muscular power. Predominance of nervous symptoms.

Hamamelis.—Tearing pains in the small of the back. Constipation with severe frontal headache. Hemorrhages from all parts.

Hepar sulph.—High fever with redness of the face and hoarseness. Stitching pains extending from ear to ear when swallowing. Hoarse, croupy cough. Swelling and suppuration of the glands. Unhealthy skin, slight injuries induce suppuration and ulceration.

Hydrastis.—Dull, heavy, dragging pain and stiffness in the lumbar region. Faintness and prostration. Great swelling, redness and itching of the skin. Excessive soreness of the throat, which is studded with dark pustules. Obstinate constipation. Is said to prevent pitting when used both internally and externally.

Hyoscyamus.—Late appearance of the eruption, causing great nervous excitement. Constant desire to get out of bed. Red, sparkling, staring eyes (*bell.*). Constrictive sensations in the throat with inability to swallow (*bell.*). Involuntary stools at night (*ars.*, *rhus*). Retention of urine (*opium*). Grating of the teeth (*apis*, *hell.*). Hyperæsthesia of the skin. Brown spots or gangrenous vesicles on the body.

Lachesis.—Headache mostly in the forehead with nausea and chilliness. Aggravation of all the symptoms after sleep. Stupor and muttering delirium (*apis*). Dry, red or black, cracked and bleeding tongue (*ars.*). Oppression of the chest. Solids swallow better than liquids. Irregularity of heart beat (*digit.*). Stitches in the throat when swallowing. Suppuration of the glands of the neck. Destructive decomposition of both fluids and solids. Passive hemorrhages of dark fluid blood. Specially adapted to a typhoid condition during suppurative stage. In intemperate persons.

Malandrinum.—Useful as a preventive, and when the secretions are very offensive. It almost invariably lessens the secondary fever. (Malandrinum is attenuated lymph from the horse-pox vesicle.)

Mercurius.—Great restlessness, weariness and prostration. Swollen, soft, flabby tongue, taking the imprints of the teeth. Putrid odor from the mouth (*bapt.*). Ulcerated throat with profuse salivation. Diarrhea or dysentery with tenesmus. Perspiration without relief (*ars.*, *opp. gels.*). Adapted to the suppurative stage.

Opium.—Complete loss of consciousness with slow stertorous breathing. Face, dark red, hot and bloated (*bell.*). Bed feels hot, can hardly lie on it. Difficult, intermitting breathing as from paralysis of the lungs (*lyc.*, *tart. emet.*). Retention of urine. Picking at the bedclothes. In children and old people.

Phosphorus.—Stupefying headache with acuteness of smell

(*bell.*). . Difficulty of hearing, especially of the human voice. Soreness of the stomach and abdomen to the touch. Pain in the back, as if broken (*rh.*). Extensive petechiæ or hemorrhages. Bloody pustules. Pneumonic complications (*lyc.*). Small, quick, easily compressed pulse. Dry, immovable tongue, cracked and covered with sordes (*ars.*, *verat. alb.*). After over-doses of camphor.

Phosphoric acid.—Great fear of death. Headache, worse from the least shaking or noise (*bell.*). Dryness of the mouth and throat without thirst (*nur.*). Involuntary stools; watery diarrhea. The pustules don't fill with pus, but degenerate into large blisters which burst and leave the surface excoriated. Confluent small-pox.

Rhus tox.—Great restlessness and uneasiness (*ars.*). Bruised pains in the small of the back when sitting still or when lying; better from motion. Active delirium and great prostration. Vivid, troublesome dreams of excessive bodily exertion. Dark, livid redness of the cheeks. Redness of the tip of the tongue in the shape of a triangle. Sordes on the lips and teeth. Hemorrhage from the mucous surfaces and into the pustules. The eruption shrinks and looks livid. Erysipelas with great burning. Glandular swellings. Confluent small-pox with typhoid symptoms.

Sarracenia.—Is said to have curative or prophylactic virtues in this disease.

Sulphur. During the stage of desiccation, and when the disease pursues an irregular course.

Tartar emet.—Stupefying headache with pressure from without inwards, in the forehead and root of the nose. White, pasty coating on the tongue. Tongue red in streaks and dry in the middle (*rh.*). Continuous, anxious nausea (*ip.*). Watery, slimy, bloody diarrhea. Great rattling of mucus in the chest. Excessive restlessness. The pustules, after drying, leave bluish-red marks. Typhoid pneumonia.

Thuja.—Boring, stitching pains in the forehead, temples and over the eyes. Conjunctivæ inflamed and red like blood. Oedematous swelling of the face' (*apis*). Marked, dark red areolæ around the pustules. Rawness and dryness in the throat. Burning from the small of the back to between the shoulders (*phos.*).

Painful drawing in the sacrum, coccyx and thighs, while sitting. Specially adapted to the stage of suppuration.

Vaccinum.—Great fear of taking small-pox, is said to be a characteristic. Has been used with success in all stages. (Vaccinum is attenuated lymph from the cow-pox vesicle.)

Variolinum.—Especially when throat symptoms are prominent. Is said to cause the disease to run a mild course, and prevent scarring. (Variolinum is attenuated lymph from the small-pox vesicle.)

Veratrum vir.—Severe frontal headache with vomiting. Sudden spasms with nausea, vomiting and utter prostration. Red streaks in the middle of the tongue; yellow edges. Burning in the fauces with constant inclination to swallow. Intense fever with irregular, hard, frequent pulse. Oppression of the chest with slow, labored breathing. Profuse sweat. Itching and burning of the skin. In plethoric individuals.

HYGIENIC AND DIETETIC TREATMENT.

The general management and nursing of the small-pox patient are highly important. The sick room should be large, *well-ventilated*, and moderately darkened. The temperature of the apartment should be kept below 60° Fahr., which in winter should be heated by an open fireplace rather than by hot air. Carpets and all unnecessary articles of furniture should be removed. The strictest attention should be given to cleanliness and to the use of disinfectants. Platt's chlorides, a solution of carbolic acid or of potassium permanganate, should be sprinkled freely over the bed and on the floor. Cloths wet in the solution should also be suspended in the room. The physician or nurse should wash the hands in some disinfecting fluid, on every occasion for touching the patient.

The body may be sponged with or bathed in tepid, carbolized water as often as proves grateful. In severe or confluent cases, the continuous warm bath as practiced in Vienna renders excellent service. When the pustules rupture, carbolized baths are frequently effectual in relieving the itching. During desquamation, warm baths every two or three days, followed by oiling the body, are useful in removing the crusts. When the pain from the distension of the vesicles is intense, the parts may be soaked in hot water, or hot water compresses applied for fifteen or twenty

minutes, and the vesicles punctured to allow the escape of their contents. To correct the offensive odor during the suppurative stage, the surface may be frequently bathed and the throat gargled with a weak solution of potassium permanganate (five or ten grains to a quart of water), or Platt's chlorides (one part to ten or fifteen of water). In confluent cases where the blebs break, marked benefit is derived from dusting the raw surface with a powder of starch and zinc oxide.

When the mucous membrane of the throat is highly inflamed, considerable relief is experienced from holding small pieces of cracked ice in the mouth. A sponge wrung out in hot water, repeated as it cools, often relieves the intense pains in the back. Hot cloths, as hot as can be borne, may be applied to the head when headache is severe. Hot water compresses may also be resorted to when there is considerable œdema of the face and eyelids. The general smarting pain, frequently experienced over the whole of the cutaneous surface, may often be relieved by inunctions with mildly carbolized vaseline. The position of the patient in bed should be frequently changed so as to avoid constant pressure on the back or nates.

The *treatment of the eruption* with a view to preventing scarring and disfiguration, is of the greatest importance. Usually the best results are obtained from careful *evacuation* of the *vesicles* by means of a fine needle, and the constant use of carbolized water dressings. And yet you will do well to remember that no measures will prevent the occurrence of a distinct cicatrix whenever the integrity of the papillary layer of the corium is destroyed. If the pustules remain superficial the pitting will be slight, but if the true skin becomes involved, pitting will occur in spite of treatment.

The *diet* consists principally of rice, corn starch and milk, which may be taken ice cold if desired. After three or four days beef tea, chicken broth, mutton broth, or yolks of eggs beaten up in milk, may be alternated with milk. Water may be administered freely, and if preferred may be given cold.

Stimulants should be given in cases of great prostration, and when extensive suppuration threatens. They may be given alone or in the form of wine whey (p. 194), or brandy punch (p. 306).

If *constipation* is present it may be relieved by the administration of enemas.

LECTURE XXIII.

Varioloid and Vaccination.

To-day, before directing your attention to *varioloid* or *modified small-pox*, I will give a passing notice to cow-pox, vaccinia in the human subject, inoculation and vaccination.

Cow-Pox.

Definition.—Cow-pox is a specific eruptive disease, occurring chiefly on the teats and udders of milch cows, and is characterized by the development of papular, vesicular and pustular lesions. It may appear either sporadically or as an epizootic, and is mainly communicable by actual contact.

Synonyms.—Kine-pock. Vaccine disease.

History.—Cow-pox has prevailed from time immemorial, but is not as prevalent now as formerly. It may prevail at all seasons of the year except midsummer, but is most common during the months of May and June.

Etiology.—It may be induced in cows in either of three ways: 1. By inoculation with the virus from affected cows. 2. By inoculation with the virus of horse-pox. 3. By inoculation with the virus of small-pox.

Clinical History.—After an incubation of from three to four days the parts become hot and tender, and a few small, red papules appear on the base of the teats and udder, which in three or four days change into vesicles and become umbilicated. The vesicles are usually pea-sized, present a glistening appearance, and are generally oval on the body of the teats and udder, but

circular on the base and neck of the teats. On the eighth or ninth day a pale, rose-colored areola appears around the vesicle, which steadily enlarges until the tenth or twelfth day, when it has attained the width of nearly half an inch. The lymph in the vesicle becomes opaque about the twelfth day, and desiccation takes place leaving brownish-black crusts which fall off in about three weeks.

Horse-pox.—Horse-pox is a similar disease to cow-pox, and will produce vaccine disease in the cow. Its eruption is more generalized than that of cow-pox, and appears on the trunk and limbs as well as upon the nasal and buccal mucous membranes.

Vaccinia.—(IN MAN.)

Definition.—Vaccinia is an affection produced by the introduction into the human system of the virus of cow-pox, or of humanized virus—a few removes from the cow-pox. It is contagious only by inoculation, and possesses valuable protective properties against small-pox.

Synonym.—Vaccine disease.

Clinical History. Between the third and fourth days after the introduction of the virus into the tissues of a previously unvaccinated subject, a light reddish, pin-head sized papule arises at the point of operation. On the fifth day an oval or circular vesicle of a bluish-white color, and surrounded by a yellowish-white margin makes its appearance. This vesicle increases in size and becomes umbilicated on the sixth day. It is now surrounded by a very narrow ring of inflammation—the areola. On the eighth day the vesicle reaches its highest degree of development and is about one-third of an inch in diameter. It is filled with a thin, transparent fluid, which becomes opalescent on the ninth day. The contents of the typical vesicle are auto-inoculable. (Between the fifth and eighth days is the time to take lymph for the purpose of vaccination). The areola enlarges during the ninth and tenth days, and attains its maximum size of about two inches in diameter. It is of a brilliant scarlet or dark red color, and is most intense at the edge of the vesicle. The skin and cellular tissue become hardened and tumefied; heat, itching and tenderness are usually marked. The contiguous lymphatic glands are apt to be irritated and swollen.

After the tenth or eleventh day the disease begins to subside. The red areola fades, the swelling and induration of the tissues abate, and the pustule—for such it has become—either ruptures or begins to dry up. Desiccation of the pustule progresses rapidly, so that about the fourteenth or fifteenth day a firm, hard, dark-brown or mahogany-colored scab has formed, having a central depression and no areola of inflammation. The scab gradually separates from the tissues and falls off about the eighteenth or twenty-first day, leaving a circular or oval depression or cicatrix, studded with several minute pits or dots. The cicatrix is at first of a deep red or purple color, but fades gradually until it finally assumes a dead-white color. The shape and size of the scar, crust and vesicle correspond with the scarification, and will be circular or irregular, according as the latter is circular or irregular. Although usually indelible, many of the most perfect cicatrices disappear entirely as life advances.

The constitutional disturbances are usually very slight. The febrile reaction about the eighth day differs in different subjects, and is generally more severe when bovine virus, procured recently from the cow, is used, than when humanized virus is introduced.

Individuals possess different degrees of susceptibility to vaccinia at different times. Children are usually more susceptible than adults.

Irregularities.—The deviations from the regular course of development of vaccinia may be either normal or abnormal.

1. *The Normal Irregularities.*—*Retardation* in the appearance of the vesicle is not uncommon. The vesicle may not show itself until the sixth or eighth day, and yet the disease may afterwards run a normal course, with no diminution of protective power.

When vaccination is performed during the incubation periods of either measles, scarlet fever or chicken-pox, and the vesicles do not reach the stage of areola, before the symptoms of the particular disease become manifest, the areola will not form until the disease has run its course.

Old vaccinations, apparently unsuccessful, have not infrequently been revived by recent vaccination.

2. *The Abnormal Irregularities.*—Vaccinia is spurious when it assumes any of the following aspects:

a.—The appearance of red, pea-sized tubercles at the seat of vaccination.

b.—The development of acuminate instead of umbilicated vesicles, with marked itching. Instead of containing clear lymph, the vesicles contain a straw-colored fluid. The scabs fall off as early as the tenth day.

c.—The formation of a bulla or bleb, instead of a papule or vesicle.

d.—The appearance of herpetic vesicles in crops, about the third day, preceded by shivering and accompanied by intolerable itching.

e.—The sudden rupture and formation of ulcers, in vesicles, which, up to the eighth or ninth day, have apparently run a normal course.

Complications.—*Vaccinal eruptions* are not uncommon after the ninth day of vaccine disease. *Roseola*, *erythema multiforme* and *lichen* are oftenest met with, and are generally of a benign character.

Erysipelas is comparatively rare, but if it does occur during the course of development of the vaccine vesicle, it completely destroys the protecting power of the vaccination. The cause of the development of erysipelas during vaccinia is frequently found in the constitution and habits of the vaccinated individual.

Eczema.—In eczematous subjects, eczema is often aroused, and is apt to interfere with the development of the vesicle, and may render the vaccination non-protective. It is advisable, therefore, not to vaccinate an individual suffering from any form of skin disease, particularly if it is vesicular in character.

Syphilis may be transmitted by vaccination with impure humanized virus, or by using an infected instrument. In such cases the blood of the syphilitic individual must have become mixed with the lymph, or else a vaccine crust from a syphilitic person must have been used. For pure, unmixed vaccine lymph cannot communicate syphilis even though taken from a syphilitic patient. Inherited syphilis not infrequently develops after vaccination, even when animal virus is used.

Glandular Swellings.—Inflammation and suppuration of contiguous lymphatic glands sometimes occur, and are annoying, though by no means dangerous complications.

Inoculation.

Definition.—Inoculation is the now obsolete method of rendering small-pox poison innocuous, by introducing variolous lymph, taken on the fifth or sixth day of the eruption, into the arm, and producing a contagious disease—capable of transmitting small-pox to others—which passes through the regular stages of small-pox in a mild and rapid course.

History.—Inoculation was employed in China and India as early as the eleventh century. It was first practiced in Constantinople in 1700. Drs. Simoni, Kennedy and Pylarini published an account of it in the English journals in 1714–15. Lady Montague, whose son was inoculated at Constantinople in 1717, introduced the practice into England, by inoculating her daughter in the year 1721. It was first performed in this country in 1721 by Dr. Boylston, of Boston, at the suggestion of the Rev. Cotton Mather. At the beginning of the present century it fell into disuse upon the advent of vaccination.

Clinical History.—On the second day after the introduction of the lymph, a minute orange-colored spot is perceptible by the aid of a magnifying glass, at the point where the operation is performed. On the third or fourth day after the operation, the punctured point becomes hardened, and a small, umbilicated vesicle seated upon an inflamed base makes its appearance. On the fifth day the vesicle is well developed, and a narrow, rosy areola is formed. On the sixth day the parts become hardened, hot and painful. In the evening of the seventh or morning of the eighth day the patient is seized with rigors, headache and vomiting. Febrile movement follows, and a variolous eruption soon makes its appearance on various parts of the body. Usually not more than twenty or thirty vesicles are formed. Sometimes not more than three or four papules can be discovered. Two hundred vesicles would form a maximum crop. After the eighth day the inflammation in the arm spreads with great rapidity, and a number of minute confluent vesicles appear upon the now large and irregular areola. On the tenth day the arm appears red, tense and shining, and the pustule, if it has not been opened, now bursts and discharges copiously. The disease now begins to subside, the areola fades, and desiccation progresses rapidly.

Surgery of Inoculation.—Inoculation is performed by introducing a minute portion of variolous lymph, taken from a fifth day vesicle, into the arm at the insertion of the deltoid, by means of a lancet.

Mortality.—The ratio of mortality after inoculation is about one per cent.

Vaccination.

Definition.—Vaccination is the introduction of *bovine* or *humanized* virus into the skin of the human subject. It is the method usually employed to induce vaccinia as a protective against small-pox.

History.—The history of vaccination dates from the latter part of the last century. It is intimately connected with the life of Jenner, who was born in 1749 at the vicarage of Berkley, in Gloucestershire, and died in 1823, full of years and honors.

On the fourteenth day of May, 1796, Jenner made his first vaccination. It was performed on a boy named James Phipps, eight years of age. The lymph was taken from the hand of Sarah Milnes—a milk-maid who had been infected by her employer's cows—and inserted by two superficial incisions. The patient passed through the disease satisfactorily and was tested on the first day of July following, by small-pox inoculation, without effect.

Vaccination was introduced into this country by Dr. Waterhouse of Boston, in July, 1800, with virus received from Jenner. It was introduced into France the same year, reached India in 1802, and rapidly came into general use.

The principle of vaccination introduced by Jenner is receiving new development, and is now being applied by Pasteur to the extinction of other diseases.

Prophylactic Influence.—The position of the medical profession on the protective power of vaccination against small-pox is, that in the majority of cases, those who have gone regularly through vaccinia are saved from any future attack of small-pox, and that in the majority of cases—where it does not prevent—it so modifies the disease as to deprive it of all danger to life.

Marson's table, giving the results of observations on nearly

five thousand post-vaccinal cases of small-pox scattered over a period of twenty years, well exemplifies this protective power.

Classification of patients affected with small-pox.	No. of deaths. in each class.	Per cent
1. Unvaccinated.....		35.
2. Stated to have been vaccinated, but having no cicatrix.....		23.57
3. Vaccinated.....		
a. Having one vaccine cicatrix.....		7.73
b. Having two vaccine cicatrices.....		4.70
c. Having three vaccine cicatrices.....		1.95
d. Having four or more cicatrices.....		0.55
e. Having well-marked cicatrices.....		2.52
f. Having badly-marked cicatrices.....		8.82
4. Having previously had small-pox.....		19.

The Virus.—In this country vaccination with *bovine* or heifer-transmitted cow-pox virus, is the rule. The current stocks are either *bovine virus* or *humanized virus*, one or a few removes from the cow-pock. The fewer removes the lymph undergoes, the more marked the freedom from post-vaccinal small-pox, after its use. Vaccine virus which has gone through many successive transmissions loses considerable of its prophylactic influence. The more frequent occurrence and greater fatality of post-vaccinal small-pox during the last twenty years, is doubtless due to the use of long-humanized virus. Erysipelas occurs with greater frequency after the use of humanized lymph, than after carefully selected bovine virus.

Quill slips and ivory points are the favorite methods of preserving animal or bovine vaccine, while the crust is the usual method of preserving humanized vaccine.

For several years past I have been accustomed to vaccinate my private patients with *bovine virus*, using the well-prepared ivory points. The points are always convenient and cleanly, and the bovine virus has in every case given satisfaction.

Period of Performance.—As a general rule, if the health of the child permits, the operation should be performed about the age of three months, thus anticipating the period of dentition.

*For a full account of the method of obtaining and storing virus, consult Harding on "Essentials of Vaccination."

Under danger of infection, however, no age should be exempt from vaccination.

The following comparative table of small-pox death-rates among vaccinated and unvaccinated respectively, for one year ending May 29, 1881, given by Dr. Buchanan, of London, shows the value of infant vaccination, and the necessity for re-vaccination.

Ages of patients.	Death-rate per million among the vaccinated.	Death-rate per million among the unvaccinated.
All ages.....	90	3,350
Under twenty years...	61	4,520
Under five years.....	40½.....	5,950

Re-vaccination.—All persons who have been vaccinated in infancy should undergo re-vaccination as they approach adult life. The best time for re-vaccination is from fifteen to eighteen years of age. All doubtful primary vaccinations should be put to the test of a re-vaccination. Under danger of infection, re-vaccination should be performed, even if only a short time has elapsed since a previous inoculation. Dr. Martin reports that he has succeeded in re-vaccinating with bovine virus in seventy-three per cent of the cases. Severe constitutional symptoms occur much more frequently after a re-vaccination than after a primary vaccination.

Surgery of Vaccination.—The preferable method of inserting the virus is by *scarification*, which consists in making a number of single or double scratches or cross scratches. A small, wedge-shaped lancet is all-sufficient for the purpose, but my preference is to use for each case a separate ivory point charged with lymph. Before inserting the point it will be necessary to “revive” the lymph with a minute quantity of cold water. The vaccination should not be performed hurriedly; the lymph must be worked into the wound until dry. In scarifying you should go deep enough to cause a slight oozing, but not a flow of blood.

The usual place for performing vaccination is upon the left arm, at the insertion of the deltoid muscle, and along its posterior border. The several scarifications or punctures—if valvular punctures are resorted to—should be made at some little distance from each other. When vaccinating by separate *punctures*—per-

formed by introducing, at an angle of about 45 degrees, beneath the cutis a well-charged needle or lancet in such a way that the lymph may gravitate into the wound—you should make such punctures as will produce at least four separate good-sized vesicles, not less than half an inch apart. After a perfect vaccination the united area of the cicatrices should amount to one-half a square inch. It is usually considered advisable to examine the vesicle on the eighth or ninth day of the disease, and also the cicatrix, as soon as it is formed.

Varioloid.

Definition.—Varioloid is an acute contagious disease, due to the small-pox contagion, occurring only in individuals who have been successfully vaccinated, or who have already had the natural or inoculated disease. It runs through the same stages as small-pox, but is of shorter duration, and may abort at any period.

Synonym.—Modified small-pox.

Etiology.—The etiology of varioloid is the same as that of small-pox. The virus of varioloid is capable of producing in persons unprotected, a severe and fatal form of small-pox.

Clinical History.—The initial symptoms are of the same character, and are often as marked, as in cases of natural-small-pox. Not infrequently in children the attack begins with slight fever attended with headache and languor, which subsides in two or three days, as soon as the eruption appears. The eruption is far less copious than in the regular form of the disease, and passes more rapidly through its successive changes. The small red spots first appear, usually on the forehead, and are immediately followed by papules, which within twelve hours may become converted into vesicles. The vesicles rapidly increase in size, and are sometimes umbilicated. On the third day they become changed into pustules, without any tumefaction of the cutaneous surface. Secondary fever seldom appears, unless the rash is extensive. When present, it is usually slight and generally disappears within twenty-four or forty-eight hours. On the fifth day the pustules begin to dry up, and desiccation may be completed by the seventh day.

The scabs begin to fall as early as the eighth day of the erup-

CHART XV.—*Varioloid.*

Nature:	Contagious				
Stages:	Invasion.	Eruption.		Suppuration.	Desiccation.
Duration:	2 to 3 days.	3 days		2 days.	2 days.
Eruption:	Erythema often present.	1st D. 2nd D. 3rd D.		Pustules limited. Small areola.	Begins on 5th day. Completed on 7th day.
		Papules.	Vesicles. Pustules.		
		Umbilicated			
Throat:	Sore throat. Dysphagia.	Slight eruption.		Pharyngitis.	CESSATION OF SYMPTOMS.
Temperature:	100° to 103°.	SUBSIDENCE OF SYMPTOMS		Slight secondary fever.	
Nervous System.	Chill. Headache. Pain in loins.			Headache. Lassitude	
Pulse:	Increased in frequency.			Slightly quickened.	
Cutaneous Surface.	Perspiration.			Unbearable itching. Sickly odor.	
Respirations	Slightly accelerated.			Slightly accelerated.	
Bowels:	Constipated.			Constipated.	
Urine:	Scanty.			Darker than normal.	
Eyes:	Injected. Lachrymation	Injected. Photophobia.		Injected. Slight oedema	
Stomach:	Nausea Epigastric tenderness.	No tenderness.		Slight tenderness.	Return of appetite.
Prognosis:	Generally favorable.				
Recurrence:	Varioloid seldom recurs.				
Incubation:	From one to three weeks				
Influence:	It reproduces the contagion of, and protects against, small-pox.				

tion, and desquamation is usually completed about the twelfth or fourteenth day. Reddish spots or blotches are left, which gradually disappear without leaving cicatrices.

Duration.—The duration of varioloid varies from ten to twenty days.

Differential Diagnosis.—The differential diagnosis of varioloid is the same as that of small-pox.

Varioloid differs from small-pox, with which it may be confounded, in the rapid development and decline of the eruption, in the small number of pustules, and in the short time required for the formation and separation of the crusts.

Prognosis.—The prognosis is generally good. Exceptionally the disease proves fatal in a ratio of from five to ten per cent.

Treatment.—The treatment for varioloid is essentially the same as for mild small-pox (p. 350).

LECTURE XXIV.

Chicken-Pox.

Definition.—Chicken-pox may be defined as an acute epidemic contagious disease, occurring for the most part in children, characterized by an eruption of oval, isolated, hemp-seed sized vesicle, appearing in *successive crops*, accompanied by a very moderate constitutional disturbance. It occurs only once in the same individual. The period of incubation is eight days.

Synonyms.—Varicella. Swine-pox. Bastard-pox. Water-pox. False variola.

History.—Chicken-pox was first described in France by Révère in 1660, and in England by Harvey in 1696.

The name *varicella*, meaning *little small-pox*, came into use about 1770.

Etiology.—The exact nature of the specific poison of chicken-pox is unknown. It may be communicated by inoculation, and attacks indifferently the vaccinated and the unvaccinated. It is commonly a disease of early life, and becomes markedly infrequent after the seventh year.

Clinical History.—After an incubation of from four to seventeen—usually eight—days, the attack sets in with slight chilliness, headache, languor, and occasionally vomiting, followed by more or less marked febrile movement. In twenty-four hours the eruption appears in the form of small, deep-red papular spots—varying in number from one dozen to several hundred—first upon the back and chest, and then upon the face and extremities. On the second day the papules have become converted into vesicles. The vesicles are of small size, usually less than

one-fifth of an inch in diameter, oblong in shape, and contain a clear, transparent fluid which gives them a bright and glistening appearance. After twenty-four hours they become slightly turbid and lactescent—not puriform. On the fourth day desiccation begins, and is usually completed within two days. The scabs, which are thin, superficial, and of a light-brown color, fall off between the eighth and ninth days. A peculiar feature of chicken-pox is the appearance of the vesicles in successive crops. Not infrequently fifty or one hundred new spots will be observed to appear each night for four or five days. The eruption is generally attended with considerable itching, and some slight constitutional disturbance. The temperature rarely exceeds 100° Fahr.

Duration.—The duration of chicken-pox varies from four to seven days.

Differential Diagnosis.—The disease with which chicken-pox is oftenest confounded, is varioloid. The following are the chief diagnostic points:

The stage of invasion in varioloid is longer and the initiatory fever is much more severe than in chicken-pox. The chicken-pox rash appears on the second day, and in a few hours becomes vesicular, while the varioloid rash both appears and undergoes vesiculation later. In varioloid, as in ordinary small-pox, the eruption appears first on the face; in chicken-pox it appears first on the body. The eruption comes out regularly in varioloid, and some of the vesicles are umbilicated. In chicken-pox it comes out irregularly and in *successive crops*, and presents no umbilication. The mildness of the constitutional symptoms is always marked in chicken-pox.

Prognosis.—The prognosis is always favorable, unless complications arise. Recurrences of the disease have never been observed.

Treatment.—Chicken-pox requires little treatment beyond attention to diet, and the careful avoidance of premature exposure to atmospheric changes. *Rhus tox.* is usually the only internal remedy required. If there is much febrile disturbance *aconite* may be of service. *Apis mel.* will prove useful if there is much itching with the eruption. *Belladonna* may be needed as an intercurrent remedy for headache and sore throat. *Mer-*

CHART XVI.—*Chicken Pox.*

Nature:	Epidemic.		Contagious.	
Initial Symptoms.	Chilliness.	Headache.	Lassitude.	
Age:	Occurs mostly in children under seven years.			
Temperature:	Rarely exceeds 100° Fahr.			
Nervous System	Slight nocturnal restlessness.			
Eruption:	1st day.	2nd day.	3rd day.	4th to 6th day
	Papules.	Oblong transparent vesicles	Lactescent vesicles.	Desiccation. Brownish scabs.
Cutaneous Surface:	Heat and itching.			
Throat.	Swelling of the lymphatic glands.			
Digestive Tract.	Moderate thirst		Loss of appetite.	
Duration:	Five to seven days.			
Prognosis:	Always favorable.			
Recurrence.	Chicken-pox occurs only once in a life-time.			
Incubation:	From four to seventeen days.			

THE ERUPTION APPEARS IN SUCCESSIVE CROPS.

THE ERUPTION APPEARS IN SUCCESSIVE CROPS.

curius or *tartar emet.* will be called for, if any of the vesicles threaten to suppurate.

The diet should be light and non-stimulating—milk is usually preferred. The irritation of the skin is best relieved by the application of oil or cosmoline.

Miliary Fever.

Though not, strictly speaking, a contagious disease, *miliary fever* is included in this class, by reason of its possessing many elements of contagion, and it is described here on account of its phenomenal prevalence in connection with measles and scarlet fever.

Definition.—Miliary fever may be defined as an acute febrile affection, occurring in the form of short, circumscribed, local epidemics, characterized by profuse sweating attended with high fever, intense pain at the epigastrium, and a sense of suffocation, followed after the third or fourth day by a vesicular eruption, which in two or three days disappears by desquamation. Its average duration is from five to eight days. Relapses are common.

Synonyms.—Sweating sickness. Sudoral exanthema. Sudor anglicus.

History.—The history of miliary fever dates back to the close of the fifteenth century, when it was first clearly described under the name of the “English sweating sickness.”

It appeared in England in 1486, shortly after the battle of Bosworth, and proved alarmingly fatal.

It re-appeared in 1507 and again in 1518, when the epidemic was extremely violent.

In 1529 it appeared in England for the fourth time, and soon extended to the continent, and overran the greater part of Europe. The last outbreak in England occurred in 1551.

After an interval of over a century and a half (1718), miliary fever re-appeared in France, Italy, Germany, Austria and also Belgium.

In 1802 an epidemic appeared at Röttingen, in Bavaria, and ran its course in ten days.

It prevailed in Italy and Germany in 1837-39, and in Belgium in 1849.

Miliary fever occurred in 1830 and 1855 simultaneously with epidemics of scarlet fever and measles. It occurred in connection with cholera in 1849-54.

Etiology.—The nature of the exciting cause of miliary fever remains as yet unknown.

Epidemics are often limited to single places, or spread only over definite areas. They prevail mostly during the spring and summer months, and last on an average from seven to fourteen days; occasionally they continue two or three months. In some epidemics from one-fifth to one-tenth of the whole population is attacked by the disease.

Like typhoid fever, miliary fever attacks the strong and the vigorous. It affects adult life mostly, and occurs oftener in women than in men. An attack affords no immunity from the disease, even during the same epidemic.

Clinical History.—The clinical history embraces a description of the stage of invasion, the sweating stage, and the stage of eruption and desquamation.

The Stage of Invasion.—The prodromal stage or stage of invasion lasts from two to three days. The patient complains of excessive irritation of the skin, thirst, headache, and general lassitude. There is generally more or less febrile movement, and not infrequently a feeling of suffocation preceded by a sense of oppression at the epigastrium.

The Sweating Stage.—In the evening or during the night of the second or third day, the second stage of the disease is ushered in, usually by rigors, seldom by a pronounced chill. A profuse and persistent sweat at once appears, accompanied by a prickling sensation in the skin, epigastric oppression, and palpitation of the heart with precordial pain. The temperature rises rapidly to 103° Fahr., and sometimes even to 105° Fahr. The pulse quickens to 130 or 140 beats per minute. The headache increases, and the palpitation of the heart becomes violent and tumultuous. The respirations become rapid, often irregular, and the sense of suffocation is extreme. The urine is generally turbid, scanty and high-colored, and there is great tenderness on pressure, in the epigastrium. After these symptoms have con-

tinued unabated, or have displayed a tendency to irregular exacerbations or intermissions for three or four days, sometimes longer, the eruption appears, and the patient enters the third stage.

The Stage of Eruption.—As the eruption appears, the symptoms of the preceding stage rapidly abate. The rash consists of irregularly shaped spots which sometimes stud the skin so thickly as to resemble the eruption of scarlet fever. It appears first upon the neck and chest, and gradually extends to the back and extremities. After a few hours vesicles appear in the center of the spots, and rapidly increase in dimensions until they attain the size of a millet seed or a small pea. The vesicles contain at first a clear fluid which gradually becomes opaque and yellowish. After two or three days they burst or dry up, and form crusts which fall off in scales, within twenty-four hours. Convalescence is usually protracted in consequence of the great debility and emaciation. In some severe cases, during the sweating stage, a typhoid condition may be developed, or a sudden and fatal collapse may occur.

Complications seldom occur; occasionally either bronchitis, pneumonia, sore throat or diarrhea accompany the disease.

Duration.—The average duration of miliary fever is from five to eight days. Epidemics last from seven days to three months or longer.

Morbid Anatomy.—Miliary fever presents no characteristic anatomical lesion.

The *blood* is thin, bright-red during life, but dark-colored after death. Hyperæmia of the lungs, liver, spleen and mucous membrane is generally present. Superficial ulcers are sometimes met with in the region of the ileo-cæcal valve. The cutaneous *eruption* is caused by the hindrance to the escape of the sweat from the sweat glands. The imprisoned secretion emerges under the epidermis around the sweat duct, and as the scales become elevated a small, clear vesicle is formed.

Differential Diagnosis.—The discrimination of miliary fever from other affections—more particularly typhoid fever, measles and dengue—having some points of resemblance to it, is, under ordinary circumstances, unattended with difficulty. The profuse sweating, the prickling of the skin, the intense oppression at the

CHART XVII.—*Miliary fever.*

Nature:	Prevails in limited epidemics.		
Stages:	Invasion.	Sweating.	Eruption and desquamation
Duration:	Two to three days.	Three to four days.	Three to four days
Cutaneous Surface.	Excessive irritation.	Profuse and persistent sweating. Hot skin.	Eruption, first on neck and chest. Papules and vesicles last two to three days
Nervous System.	Headache.	Intense headache.	SYMPTOMS INEVITABLE, THOUGH NOT INVARIABLY, SUBSIDE.
Temperature:	Slight fever.	103° to 105°.	
Pulse.	Accelerated.	120 to 140.	
Heart	Precordial distress	Palpitation. Precordial pain	
Respiration.	Suffocative feeling	Rapid Irregular. Suffocative feeling.	
Digestive Tract.	Thirst Oppression at epigastrium	Nausea Oppression at epigastrium.	Profuse.
Urine:	Turbid and scanty.	High-colored Suppressed.	
Prognosis:	Favorable in moderate cases		
Convalescence.	Often protracted.		
Relapses:	Relapses are of common occurrence.		

epigastrium, the precordial pain, the feeling of suffocation, and the peculiarity of the eruption, readily distinguish it from all other epidemic diseases.

Prognosis.—The mortality varies in different epidemics; its average is from eight to ten per cent. The prognosis is generally favorable when the disease runs a regular course with only moderate severity. It is unfavorable when the temperature is high, the sweating profuse, and the sense of constriction intense; also when violent delirium, convulsions, coma or profuse hemorrhages supervene.

Death most frequently occurs in the sweating stage, during the exacerbation which precedes the appearance of the eruption.

Treatment.—Principal Remedies.—*Bryonia* is the main remedy during the first part of the disease. It is specially indicated if typhoid symptoms threaten. *Aconite* will be needed when there is great nervous excitement and marked febrile movement. *Cactus* will often relieve the palpitation and the sense of constriction with precordial pain. *Arsenicum* is called for if there is much anxiety and restlessness, with burning fever. *Jaborandi*, *sambucus* or *mercurius* should be thought of when the sweating is very profuse. *Ipecac* if there is intense dyspnoea with a fainting sort of nausea. *Apis* when there is much itching, or urinary suppression threatens. *Sulphur* during desiccation, and *Cinchona* during convalescence.

Other remedies not infrequently of service are, amm. carb., ant. crud., bapt., bell., caust., cham., convallaria, digit., hepar sulph., hyos., lach., mez., nat. mur., phos., polyporus, puls., rhus tox., selen., sil., spig., sulph. acid, and verat. alb.

The patient should be kept in bed and given a moderately nutritious diet. Frequent sponging of the surface with warm water is highly beneficial. Stimulation may be needed in severe cases.

LECTURE XXV.

Measles.

Measles is the most prevalent of all the fevers.

Definition.—It may be defined as an acute, epidemic contagious disease, lasting about seven days, occurring mostly in early life, characterized by an eruption of red spots resembling flea-bites, which coalesce into crescents, accompanied by catarrhal symptoms, more or less fever, and general constitutional disturbance. It is generally unattended with danger, but is especially liable to be followed by sequels. It rarely occurs a second time in the same individual. The period of incubation averages from nine to twelve days.

Synonyms.—Rubeola. Morbilli. Rougeole. Masern.

History.—Measles invaded the world about the same time as small-pox. It is supposed to have started on the shores of the Red Sea during the fifth or six century.

It was described by the Arabian physician Rhazes in the early part of the tenth century. The term *rubeola* was introduced somewhat later by the Latin translators of Hali Abbas, who described it under the name *Hasba* or *Alhasbet*.

Rhazes and Avicenna taught that small-pox, measles and scarlet fever were the same disease.

Measles was first distinguished from small pox by the Arabian physicians of the twelfth century. Morton viewed measles and scarlet fever as products of the same miasm, and believed that they stood in the same relation as distinct and confluent small-pox.

In 1670 Sydenham carefully restricted the term *morbilli*—hitherto used in describing scarlet fever and measles as one dis-

ease—to measles, and clearly distinguished the latter from small-pox. Measles and scarlet fever, however, continued to be confounded until about one hundred years ago.

The first records of true epidemics of measles were furnished by Forest in 1563.

Etiology.—1. *The Predisposing Causes.*—Measles appears at all seasons of the year, and affects every latitude. Epidemics are more severe during the winter than during the summer months.

Meleorological conditions exert little influence upon measles. Low and damp situations, however, are supposed to favor its prevalence and encourage the development of complications and sequels.

Age exerts considerable influence as a predisposing cause. It is for the most part an affection of early life, being most frequent between the ages of two and five years. After fifteen years the liability to the contagion diminishes but never entirely disappears among those who are not protected by previous attack.

Sex exerts little influence. The statistics of measles show that males are more frequently attacked than females.

Race and *nationality* have but little influence. The susceptibility to the contagion is almost universal. Savages have sometimes suffered greatly from it.

2. *The Exciting Cause.*—Measles is caused by a specific poison, the exact nature of which is still unknown. Klebs and Keating describe it as a micrococcus. It is found in the mucous secretions and in the blood of individuals suffering from it, and may be conveyed by inoculation. It may be carried in the clothing and in fluids—which act as fomites—from one place to another. Measles, therefore, is in a certain sense a *portable* disease. It is contagious in all its stages, and its poison is more tenacious than that of either small-pox or scarlet fever. As a rule, a person unprotected is more certain to take measles than is an unprotected individual to contract small-pox or scarlet fever under similar circumstances of exposure. The period of incubation varies from five to twenty days—usually it extends from nine to twelve days.

Clinical History.—The clinical history embraces a description of the premonitory, eruptive and desquamative stages.

Premonitory Stage.—At the close of the period of incubation—a period without fever, and free from local symptoms—the disease sets in with symptoms resembling those of a severe cold, or rather an attack of influenza. The patient is languid and chilly, and complains of frontal headache, and pains in the back and limbs. There is coryza with frequent sneezing, and a constant irritating, watery discharge from the nostrils. Febrile movement, accompanied by irregular chilly sensations and shivering soon follows, and the temperature may rise to 102° Fahr. or 104° Fahr. The eyes are injected and watery, and the tears excoriate the face. There is great drowsiness with wandering and screaming at night. The tongue is usually furred, the appetite is either impaired or lost, and, in some cases, nausea and vomiting occur. The bowels are either natural or there may be slight constipation or diarrhea. There is slight soreness of the throat with a dry, hoarse, laryngeal cough, and slight dyspnoea. A rose-colored, punctate redness of the tonsils, roof of the mouth and palate is frequently observed twenty-four hours before the eruption appears. A red papule is often observed near the free border of the uvula several days before the rash appears upon the skin.

This stage lasts from three to five—usually four—days. Upon its conclusion the eruption appears, usually with an increase of the fever, which had in a great measure abated, and an elevation of the temperature to 103° Fahr., or even 106° Fahr.

The Eruptive Stage.—The eruption appears usually first upon the temples and forehead, and thence extends in about thirty hours over the neck, trunk and extremities, appearing latest upon the dorsum of the hand. At first it presents the appearance of minute, round, bright rose or deep red spots, not unlike flea-bites, varying between one-twentieth and one-fourth of an inch in diameter. Scanty at the beginning, these flat-topped papules—for such they rapidly become—soon become numerous, especially on the face, and are often crowded together in patches of a crescentic or semi-lunar shape, with normal colored skin between them. When pressed upon, their color disappears, to return rapidly from the center to the periphery, when the pressure is removed. After the eruption has existed for two or three days,

it begins to fade, first from the face, and successively from the neck, chest and extremities.

As the rash makes its appearance, the skin becomes hot and swollen, especially on the face, and is attended with more or less itching and burning. The coryza increases, the fever rises, and there is a general exacerbation of the symptoms. The pulse ranges from 100 to 140 or even 160, and the temperature may run up to 104° Fahr. or 106° Fahr. It remains at 102° Fahr. or 103° Fahr. in ordinary cases. The respirations are short and hurried. The cough continues and is loud, hoarse and frequent. It has been termed the "*iron cough*" of measles. Bronchial rales are frequently seen upon the physical exploration of the chest. The irritation of the eyes continues, and not infrequently there is conjunctivitis. The tongue is covered with a thick, creamy fur in the center, but is clean and red at the tip and edges. The sore throat continues, and there is marked redness of the tonsils, pharynx and soft palate. The urine is turbid and scanty, and contains urates. The duration of this stage is from three to four days.

The Stage of Desquamation.—After the eruption has reached its height—usually on the second day—the disease remains nearly stationary during the balance of the eruptive stage, and then gradually abates. The rash now begins to fade, the temperature declines two or three degrees, the pulse lessens in frequency, and the catarrhal symptoms subside. The eruption, as a rule, begins to decline upon any part, about thirty-six hour from the time of its first appearance upon that part. It steadily disappears from above downwards in the order in which it first appeared; not infrequently it will have faded from the face and neck, while it is still more or less prominent upon the extremities. The cuticle desquamates in the form of furfuraceous or branny scales in a considerable number of the cases, leaving yellowish-brown pigmentations of the surface, where the elements of the eruption have existed. These pigmentations or stains remain a variable length of time, and are gradually removed by absorption. Desquamation is usually accomplished in from three days to one week, and is often scarcely noticeable. Coincident with the disappearance of the eruption, the febrile movement ceases, and the patient becomes convalescent.

Duration.—The duration of the disease varies from twelve to sixteen days.

Irregular Types.—Anomalous cases of measles not infrequently occur during the course of epidemics. They are dependent partly upon the intensity of the poison, partly upon the degree of physical vigor, and partly upon the hygienic surroundings.

• At times the eruption is irregular and fitful. In mild cases it may fade in a single night, and no evil consequences result from the disappearance. Occasionally the papules are small in size, few in number, and light colored. The order of their appearance may be partially reversed, so that instead of cropping out first upon the face and then upon the trunk, they may show themselves first on the trunk, and afterwards on the face. Sometimes the stains after desiccation assume a livid or purplish hue, unattended by malignant or dangerous symptoms. An irregular variety occasionally prevails epidemically, among the poorly nourished and badly hygiened, characterized by a tendency to ulceration of the mucous surfaces. Cases formerly described as presenting catarrhal and febrile symptoms without the eruption—*rubcola sine eruptione*—were, to say the least, very doubtful cases of the disease, while those alluded to as measles without catarrhal symptoms—*rubcola sine catarrho*—were in all probability, simply cases of roseola.

Malignant Measles.—This irregular type of the disease generally prevails epidemically; occasionally it occurs sporadically. It is commonly known as "*black measles*," and may appear in either of two forms:

1. An irregular form in which there is a very high range of temperature from the beginning of the attack. There is usually great restlessness, dyspnoea, and dryness of the tongue. The eruption, which at first may be bright-red, early assumes a dark-claret hue. The dark color of the eruption is due to the changes in the blood consequent upon the high temperature.

2. A form, called by some *hemorrhagic measles*, in which the eruption is largely composed of petechial spots scattered over the surface. A few days after the onset of the fever and the appearance of the eruption as in the ordinary form of the disease, the eruption assumes a dark color, and the symptoms take

on a typhoid character. The tongue becomes dry and glazed in the center, sordes collect upon the teeth, and there may be vomiting and diarrhea. The peculiarities of this form are dependent upon a hemorrhagic diathesis.

In either of these irregular types the patient may die of exhaustion, or of congestion of the internal organs, or from hemorrhages.

Complications and Sequels.—The most important complications of measles are seated in the respiratory system.

Capillary bronchitis, following the ordinary bronchial catarrh of the disease, is most apt to occur in young children. It may develop at any stage, and is always of serious import. The great danger when the bronchitis becomes diffuse and extends into the finer tubes, is that atelectasis and secondary lobular pneumonia will ensue, and destroy the life of the patient by cutting off extensive areas of breathing surface. Capillary bronchitis is attended with increasing dyspnœa, lividity of the face and extremities, and great prostration. Crepitant and sub-crepitant rales at the lower portions of the posterior dorsal regions, without dullness at first, and with increased resonance later, usually attend its appearance. In children under three years of age capillary bronchitis generally proves fatal.

Pneumonia may occur at any time during the course of the disease, but is not liable to follow after the eruptive stage. It is always attended with danger, and in very young children is likely to prove fatal.

Catarrhal laryngitis is a not uncommon complication. It is often accompanied by pharyngitis and is characterized by soreness of the larynx, and a loud, shrill, ringing cough.

Acute miliary tuberculosis not infrequently occurs as a sequel of measles in adults.

Colitis may occur as a complication during the initial stage or at the beginning or close of the eruptive stage.

Secondary *meningitis* may occur as a complication during the decline of the rash.

Conjunctivitis, otorrhœa and suppuration of the cervical glands are common sequels in patients who have a strumous diathesis.

CHART XVIII.—*Measles.*

Nature:	Epidemic.	Contagious.	Portable.
Stages:	Premonitory.	Eruptive.	Desquamative
Duration:	Four days.	* Four to six days.	Two to six days.
Chest:	Bronchial catarrh.	"Iron cough." Hoarseness.	Cough gradually disappears.
Skin:	Hot and dry	Papular crescents. First on face. Itching.	Branny scales. Itching.
Throat:	Sore throat. Reddish puncta.	Pharyngitis. Reddish puncta.	SUBSIDENCE OF SYMPTOMS
Eyes:	Watery. Injected.	Conjunctivitis.	
Nose:	Coryza. Sneezing.	AGGRAVATION OF SYMPTOMS.	
Head:	Drowsiness. Frontal headache.		
Urine:	Scanty. High-colored.		
Tongue:	Moist. White.		Moist. Clean
Stomach:	Thirst. Anorexia.	Constipation or diarrhea.	Appetite returns.
Bowels:	Constipation.		Normal.
Pulse:	100 to 120.	100 to 120 or 160.	Falls to normal.
Temperature:	102° to 104° first day. Declines 2nd and 3rd day.	103° to 107°	Rapid defer- vescence.
Complications:	Bronchitis. Pneumonia. Conjunctivitis. Colitis.		
Incubation:	Ten to fourteen days.		

ANALYSIS OF CHART.

The Nervous System.—*Chilly sensations* and *shivering* usually usher in the attack.

Headache is a prominent and early symptom. Oppressive frontal pains are scarcely ever absent. They extend across the brow and to the root of the nose.

Drowsiness often exists during the premonitory stage, after which the patient is usually restless and sleepless.

Convulsions sometimes occur at the onset of the disease, in children.

Mild delirium is not uncommon.

The Respiratory Tract.—A more or less extensive hyperæmia of the mucous membrane of the respiratory tract is invariably present.

There is coryza with general catarrhal symptoms. The *eyes* are injected and watery, and the eyelids are swollen and reddened. There is abundant lachrymation. Conjunctivitis not infrequently occurs during the eruptive stage. Sneezing is frequent, and the discharge from the nose is abundant. Epistaxis sometimes occurs. Sore throat with tickling sensations and difficulty in swallowing is often complained of, and is due to inflammation of the pharynx and neighboring parts. Occasionally in the premonitory stage, the roof of the mouth, soft palate and uvula, exhibit minute rose-colored puncta. Hoarseness is common. All the catarrhal symptoms are, as a rule, increased in intensity during the development of the eruption. The most common period for the occurrence of pulmonary complications is the initial stage.

Cough is a prominent symptom. It is apt to be frequent and distressing, and is harsh, hollow and brassy. Not infrequently it is worse towards evening and at night. The respirations may be hurried and short. Sonorous and sibilant or mucous and sub-crepitant rales are frequently detected upon both sides of the chest in the course of the attack.

The Temperature.—The initial or prodromic fever in measles is usually complete in from twelve to twenty-four hours, during which time the temperature rapidly rises to 102.5° Fahr. or 104° Fahr. The height attained during this stage is an index of future elevations, which tend to exceed the initial rise by

from 1° Fahr. to 2° Fahr. The initial rise is generally followed by a rapid descent the next night, so that on the following morning the temperature seldom exceeds 100° Fahr., and may be normal. The fever of eruption begins with renewed rise of temperature, and unlike the initial fever, has only temporary remissions until the rash is fully developed. In normal cases the maximal temperature is reached in from twenty-four to thirty-six hours after the beginning of the eruptive stage, and is contemporaneous with the fullness of the eruption. In others it may precede the acme of eruption, on account of some complication. When the temperature is at its maximum, the thermometer in the axilla may register 106° Fahr. and even higher. Should the acme begin in the evening, the next morning remission will be either slight or missing.

Defervescence begins usually in the night, as the eruption begins to decline, and runs a rapid course, the temperature reaching the normal on the second morning. At times it is protracted by bronchitis and other complications. Sub-normal temperatures are occasionally observed in the first days of convalescence.

The Pulse.—The pulse ranges from 100 to 120 beats per minute, and in young children may reach 160 beats. As the eruption passes its maximum of development the pulse lessens in frequency, and rapidly returns to the normal, unless quickened by complications.

The Cutaneous Surface.—The skin is usually hot and dry, and during the eruptive stage there is more or less swelling of the surface with itching and burning.

The eruption of measles appears, as a rule, on the fourth day. Exceptionally it is met with as early as the second day, or not discovered until as late as the fifth or seventh day. It consists of slightly elevated isolated spots of a bright or deep red color, varying from half a line to three lines in diameter. It is first seen upon the face—temples and forehead—and gradually spreads over the trunk and extremities. It requires, in most instances, from thirty-six to forty-eight hours for its full development. Its average duration is from four to six days.

The course of the measles eruption, is as follows: at first the lesion consists of little, fine, red dots, not unlike flea-bites, which

soon develop into true papules with broad, flat summits. After a short time these papules become numerous, and are crowded together in irregularly crescentic patches. The skin between the patches usually presents a natural appearance, although in severe cases when the patches are numerous, the whole cutaneous surface may assume a deep red tint. The eruption reaches its acme on the second day, and remains stationary about one and a half or two days, and then fades, wholly disappearing about the sixth day after its appearance. The time which elapses between the starting point of the period of incubation—the moment of contagion—to the maximum of eruption, averages about fifteen days. As the eruption disappears it loses its bright red color and becomes a yellowish-red, which gradually fades until nothing but a staining of the surface is left.

Desquamation follows the disappearance of the eruption. It is generally fine and bran-like, and proceeds from above downwards.

The Digestive System.—*The tongue* is generally moist, white and somewhat furred. During the eruptive stage it is usually coated in the middle, but red at the tip and edges. A *dry* tongue with a temperature of 106° Fahr. or 107° Fahr. on the first day of the eruptive stage, is indicative of malignant or black measles.

The appetite is, as a rule, impaired up to the stage of decline of the eruption. Thirst is commonly present. Nausea and vomiting occur in the early stages in a small proportion of cases.

Constipation is of frequent occurrence. *Slight diarrhea*, lasting from one to three days, is often present during the eruptive stage.

Colitis with inflammation and tumefaction of the solitary glands, occurring during the stage of eruption, is indicative of danger, especially in young children.

The Urine.—The urine is usually diminished. It often shows but little change, but is commonly, as in other fevers, concentrated and high colored. It is of a dark yellow color in the eruptive stage; not rarely, it contains traces of albumen.

Morbid Anatomy.—Measles presents no characteristic anatomical lesions, other than the changes in the skin and mucous membranes.

The *blood* is usually thin and dark colored, and is deficient in fibrin and red corpuscles. Klebs found the micrococci of measles in the blood taken from the hearts of infant cadavers. Drs. Braidwood and Vacher found highly refractile spherical bodies in the breath of measles patients, and similar bodies, together with rod-shaped fusiform and ovoid bodies in the corium, lungs and liver. Dr. Keating found micrococci not only in the liquor sanguinis, but also in the substance of the white corpuscles in the blood in malignant cases.

The mucous membrane of the eyelids, nose, pharynx, larynx, and larger bronchi is more or less intensely congested. It presents a reddish or slightly blackish appearance, and exhibits the ordinary anatomical changes of acute catarrh. The catarrh which may be considered pathognomonic, is usually most severe immediately preceding and during the early period of eruption. Micrococci and bacteriform elements have been observed in the nasal mucus and in the catarrhal secretions of the respiratory tract. •

Evidences of capillary bronchitis and catarrhal pneumonia are, not infrequently, found after death.

The *eruption* of measles during life, is papular. In its early stages, slight hyperæmia at the orifice of a hair-follicle, with slight swelling from effusion of plasma is observed. Around the hyperæmic papule a roseolous patch, due to hyperæmia of the papillary body, soon appears. In form the patches are crescent-shaped, their outlines are sharply defined, and their color is bright red, sometimes shading off into blue. Not infrequently each patch contains several papules, and then the early papule usually occupies the place of a hair follicle. As soon as the patches have reached their maximum of development, their color begins to fade. The pale-brown stains which remain after the fading of the rash, are due to changes in the escaped red corpuscles, and may be visible two weeks. No traces of the eruption can be found on the dead body.

Congestion and inflammation of the colon with inflammation and tumefaction of the solitary glands sometimes occur.

The spleen is somewhat enlarged, and there is more or less extreme congestion of the internal organs.

LECTURE XXVI.

Measles.—(CONTINUED.)

Differential Diagnosis.—The direct diagnosis of measles must remain more or less doubtful, until the eruption appears. Of diagnostic importance during the epidemic prevalence of the disease, are, the suffused eye, the swollen eyelids, the coryza and sneezing, and the frequent, hoarse, scraping cough with fever, thirst, pain in the frontal sinuses, and the appearance of a punctated eruption on the hard and soft palate fifteen or twenty hours before the development of the cutaneous rash. Ordinarily, after the eruption has come out fully, the diagnosis is not difficult.

The diseases for which at first sight it may be mistaken, are, influenza, scarlet fever, german measles, small-pox, roseola, typhus fever and the erythematous syphilide.

The main points of contrast between *measles*, *scarlet fever*, *german measles* and *small-pox*, are arranged in a tabular form upon pages 402 and 422.

Roseola and measles present some points of resemblance, the most important of which relate to the character of the rash. The eruption in measles, appears on the fourth day, and is partially confluent. It is preceded and attended by catarrhal symptoms, and by fever which runs a characteristic course. The eruption of roseola appears on the first day, presents no catarrhal symptoms, and is attended with but slight fever. Measles is contagious; roseola is non-contagious.

The differential diagnosis between *measles* and *typhus fever* may be found on page 291.

Measles may be differentiated from the *erythematous syphilide* by the glandular changes which characterize the latter disease.

Prognosis.—The prognosis in simple, uncomplicated cases of measles, is always favorable. In malignant cases it is of necessity grave. Pregnancy in women, and dentition in children, render it unfavorable.

The conditions for a favorable prognosis are: when the disease is primary, when the eruption occurs on the fourth day and runs a regular course, when the fever is moderate, and when the cough and other symptoms diminish with the fever.

The conditions for an unfavorable prognosis are: when the disease pursues an irregular course, when the symptoms of the premonitory stage are violent and the temperature reaches 105° Fahr. or 106° Fahr., when the tongue becomes dry, when the eruption becomes livid, when the fever does not disappear with the eruption, when profuse hemorrhages from the mucous surfaces occur, when the cough, dyspnoea or diarrhea continue, or when the disease occurs in a patient suffering from some chronic disease.

The occurrence of any of the more serious complications, such as capillary bronchitis, catarrhal pneumonia, colitis, etc., always renders the prognosis bad.

The mortality of measles is generally slight, except during malignant epidemics, and when occurring in badly-nourished, cachectic and scrofulous subjects. It is much greater in adults than in children. When death occurs, it is mostly during or after the second week of the disease.

Treatment.—*Prophylaxis.*—*Isolation* is the most effective preventive measure. It should be instituted as early as possible, and continued for some time after the eruption has disappeared. At least one week should elapse after the fall of the temperature to the normal, or after the entire disappearance of the rash, before the patient should see any one other than the attendants. The contagiousness is somewhat diminished by frequent bathing, and by night and morning inunctions.

Pulsatilla, though generally recommended, is of doubtful efficacy as a prophylactic.

Principal Remedies.—*Aconite* is adapted to the febrile and catarrhal symptoms of the premonitory stage. It mitigates the fever, and allays the nocturnal cough and feverish restlessness. *Gelsemium* is indicated when the eruption is slow in appearing.

when there is drowsiness with high fever, and when there is a tendency to convulsions. *Veratrum viride* is needed if there is much cerebral or nervous irritation with tendency to convulsions, or if congestion of the lungs threatens. *Belladonna* is of use early in the disease, if there is much irritation of the fauces or larynx, or a dry spasmodic cough; also, if there is a tendency to delirium.

Euphrasia is indicated when the catarrhal symptoms are chiefly nasal and conjunctival, when the eyes are very sore, and when there is profuse, fluent coryza. Dry cough is a characteristic. *Kali hyd.* may be useful in the premonitory stage, when the catarrhal symptoms are marked. It is preferable to *euphrasia* when chest symptoms are prominent. *Pulsatilla* is indicated when there is dry coryza, and when there is marked nervous irritation in the early days of the eruptive stage. It is the chief remedy when gastric symptoms are troublesome. *Bryonia* is needed when the eruption recedes or becomes livid, and typhoid symptoms appear. It should be given early, when there is inflammatory irritation of the bronchi. *Kali bich.* is suitable when there is hoarse scraping in the chest, or when simple bronchitis supervenes. *Phosphorus* is called for when pneumonic complications exist, especially when hoarseness, dry, hacking, hollow cough with raw scraping feeling in the chest, and mucosanguinolent expectoration are present. *Tartar emet.* is useful for either the bronchitis or the pneumonia, when there is oppression of the chest with difficult, rattling breathing. *Ipecac* may be given for retching and vomiting, and for teasing cough from tickling in the throat with dyspnoea. *Red iodide of mercury* for glandular swellings and for obstinate cough during convalescence.

Gelsemium, *bryonia*, *cuprum acet.*, *opium*, *ipecac* and *ammonium carb.* are the principal remedies for suppression or retrocession of the eruption. *Arsenicum* is the main remedy in malignant cases, when the eruption is of a dusky hue and there is great depression with blueness and coldness of the surface. *Secale* is useful in low putrid states, and when gangrene threatens.

As intercurrents: *coffea* may be needed for wakefulness. *Hepar sulph.* for wheezing, or slightly loose, croupy night cough. *Spongia* for dry, croupy cough with burning in the larynx and trachea. *Hyoscyamus* for short, dry, titillating night cough. *Eupatorium perf.* for loose, nocturnal cough during convales-

cence. *Mercurius cor.* for dysenteric stools. *Arsenicum* or *verat. alb.* for diarrhea.

Silicea, *mercurius* and *hepar* are most important remedies for otorrhœa. *Arsenicum*, *mercurius cor.* and *hepar* for ophthalmia. *Sulphur* and *mercurius* during the decline of the eruption. *Antimonium crudum* during convalescence, when the appetite does not return and the tongue remains thickly coated. *Cinchona* and *phosphoric acid* if there is much debility during convalescence.

Leading Indications.—Aconite.—High febrile excitement with full, hard, quick pulse. Restless sleep with jerking and starting. Distressing pressure at the root of the nose (*merc.*). Grating of the teeth (*hell.*). Short, dry, racking cough from tickling in the larynx, with or without oppression. Stitches in the chest (*bry.*). Coryza with sneezing (*sang.*). Pain in the stomach and bowels with vomiting and diarrhea.

Ammonium carb.—Fluent coryza with stoppage of the nose. Burning water runs from the nose (*merc. cor.*). Roughness and scraping in the throat (*caust.*). Cough worse after midnight. Dyspnoea from retrocession of eruption. Child starts from sleep, cannot get his breath. Adynamic state.

Antimonium crud.—Child is delirious and drowsy with hot, red face. Redness and inflammation of the eyelids (*merc.*, *sulph.*). Tongue coated thick, white (*bry.*, *merc.*). Gastric derangements, (*puls.*). Pains in the ears.

Apis mel.—Confluent eruption and œdematous swelling of the skin (*ars.*). Eyelids swollen, red and œdematous. Intensely deep, red rash (*bell.*). Catarrh of the bowels with diarrhea. Prostration, muttering and delirium.

Arsenicum.—Great anxiety and restlessness. Extreme debility with dyspnoea on lying down. Frequent sneezing with profuse, watery discharge from the nose, corroding the lips and making the upper lip sore (*arum*, *merc. cor.*). Profuse lachrymation and burning in the eyes (*aconite*). Great thirst with chilliness after drinking. Pale, earthy color of the face. Cough with frothy, tough expectoration. When coughing a pain extends from the lumbar region down into the thighs. Diarrhea; the evacuations excoriate the anus (*merc.*). Petechiæ. In adynamic cases.

Belladonna.—Constant drowsy sleep, or drowsiness with inability to go to sleep. Starting and jumping during sleep with flushed face and red eyes. Dryness of the nose with dull, frontal headache. Frequent sneezing, sore throat and hoarseness. Dry, spasmodic or hollow, hoarse cough, worse at night (*dros.*). Over-excitability of all the senses (*coffea*). Convulsions.

Bryonia.—Dry, painful cough with roughness and dryness of the larynx. Great dyspnoea and quick breathing. Congestion of the chest with shooting and stitching, increased by deep breathing (*phos.*). Urination when coughing (*cina*). Rheumatic pains in all the limbs. Retrocession of eruption with prostration and fever. Constipation. Sitting up in bed causes nausea and faintness.

Camphor.—Great anxiety and restlessness (*ars.*). Suppression of eruption (*bry., cuprum*). Pale, anxious face. Bluish-purple color of the skin. Suffocative dyspnoea. Weak, scarcely perceptible pulse. Sudden and great prostration with spasmodic stiffness of the body. In cases assuming a malignant form. Painful and difficult urination occurring as a sequel (*apis*).

Carbo. veg.—Pressive headache in the forehead just over the eyes. Painful stitches through the head when coughing (*bry.*). Itching on the margin of the lids (*sulph.*). Violent, almost constant eructations (*puls.*). Persistent hoarseness (*caust., phos.*).

Cuprum acet.—Nausea and vomiting, relieved by drinking cold water (*bry.*). Sudden retrocession of eruption (*amm. carb., bry.*). Epileptiform convulsions. Spasmodic attacks of dyspnoea. Blueness of the face and lips (*lach.*).

Drosera.—Paroxysmal cough after measles. Constrictive pain in both hypochondria which impedes coughing. Must support the sides with the hands when coughing (*eupat. perf.*). Hoarseness with oppression of the chest, worse from talking (*caust., phos.*). Barking cough (*rumex*).

Eupatorium perf.—Coryza with sneezing, hoarseness, and aching pains all over as if bruised (*arn.*). Headache with pain and soreness in the eyeballs; photophobia. Cough with retching (*dros.*). Hacking cough in the evening with soreness in the chest (*caust.*); must support the chest with the hands when coughing (*dros.*).

Euphrasia.—Dull frontal headache (*merc.*, *puls.*). Profuse, fluent, bland coryza with scalding tears (*opp. ars.*); aversion to light. Burning in the eyes with lachrymation. Dry, tickling, laryngeal cough during the day, relieved by eating and drinking.

Gelsemium.—Chilliness along the spine. Sneezing with tingling, especially in the left nostril (*graph.*). Stoppage of the right nostril; irritating discharge from the left nostril with scalding sensation. Bruised feeling in the eyes (*bry.*). Shooting pains in the ears when swallowing. Sore throat with collection of mucus. Rawness of the chest with hard, painful cough. Great drowsiness during the fever. Retroceding eruption with livid spots, and cerebral symptoms.

Hepar sulph.—Intense headache above the nose (*merc.*). Darting pains in the ears with cracking noises when blowing the nose. Feeling as of sand in the eyes (*sulph.*). Roughness and scraping sensations in the throat (*nur.*). Cough with constant hoarseness. Cough caused by uncovering any part of the body (*rhus.*).

Ipecacuanha.—Coryza with stoppage of the nose. Tardy appearance of the eruption with oppression of the chest (*puls.*). Incessant, dry, titillating cough, with rattling of mucus. Much nausea and vomiting. In delicate children.

Kali bich.—Frontal headache, usually over one eye (*sang.*). Lateral headache in small spots. Fluent, acrid coryza, excoriating the nose and lips (*arum*, *merc. cor.*). Flowing of water from the eyes, with burning when opening them. Stitches in the left ear, extending into the neck and head, with swelling of the glands (*merc.*). Rattling cough with viscid, stringy expectoration. Morning hoarseness (*caust.*, *hepar*).

Kali hyd.—Violent sneezing, and running of acrid water from the nostrils. Sensation of fullness and tightness at the root of the nose, with throbbing and burning pains in the nasal and frontal bones (*kali bich.*). Burning in the eyes with profuse lachrymation. Rawness in the larynx; stitches from the sternum to the back. Short, dry, hacking cough with whitish and greenish expectoration.

Lachesis.—Fluent coryza and lachrymation (*ars.*, *kali hyd.*). Throat sore, especially when touched (*apis*). Pain in the left

ear when swallowing. Dry, spasmodic, nightly cough, aggravated by sleep. The eruption appears slowly, or turns black or bluish. Sordes on the teeth. Inability to protrude the tongue.

Mercurius.—Frequent sneezing with profuse, fluent, corrosive coryza (*arum, kali hyd.*). Burning in the eyes and profuse flow of tears. Inflamed and ulcerated tonsils (*bell., hepar*). Stitches in the right side of the chest when sneezing or coughing (*bry.*). Constipation, or mucus, bilious diarrhea. Slimy stools, streaked with blood. Much sneezing without relief.

Nux vom.—Coryza with sneezing, worse in the morning and after eating. Great debility with over-sensitiveness of all the senses (*cinch.*). Drowsiness in the day-time and after eating. Dry, racking cough with headache as if the skull would burst.

Phosphorus.—Throbbing headache; headache over the left eye (*aco.*); worse in the evening. Frequent sneezing with alternately fluent and dry coryza. Difficult hearing, especially of the human voice. Hoarseness and roughness of the voice (*caust., hepar*). Dry, tickling cough with tightness across the chest, relieved by pressure upon the external walls. Cough worse before midnight, and from reading, laughing or speaking; better after sleeping (*opp. lach.*). Mucous rales in both lungs, especially the lower lobes (*ipeccac, tartar emet.*). Painless, watery diarrhea. Typhoid symptoms with loss of consciousness.

Pulsatilla.—Fuent or dry coryza with frequent sneezing, and loss of taste and smell (*sulph.*). Inflammation of the eyes with profuse lachrymation (*euph.*). Darting, tearing, pulsating pains in the right ear at night (*merc.*). Roaring in the ears, as if from the rushing of waters. Dry cough at night or in the evening, especially after lying down (*hyos*). Loose cough with vomiting of mucus, and nightly diarrhea. Gastric disturbances (*nux*). Chronic, loose cough occurring as a sequel.

Rhus tox.—Frequent, violent, spasmodic sneezing. Hot, acrid discharge from the nose. Aching, pressing pains in the eyes (*caust.*); oedema of the lids (*apis*). Short, dry cough from tickling in the bronchi (*rumex*). Putting the hands out of bed brings on the cough (*hepar*). Great restlessness, must change position often (*opp. bry.*). Typhoid symptoms.

Sticta.—Incessant sneezing, with a feeling of fullness in the right side of the forehead down to the root of the nose, with

tingling in the right nostril. Splitting frontal headache. Dry, racking cough in the evening and at night, excited by inspiration. Cough from tickling in the right side of the trachea, with oppression of the chest. Conjunctivitis with profuse but mild discharge.

Stramonium.—Frightful visions before the outbreak of the eruption. Tries to escape, struggles to get out of bed (*bell., rhus*). Dryness of the throat with violent thirst, especially for sour drinks (*bry.*). Constant restlessness with jerking motions of the limbs and of the whole body. Difficult deglutition from spasmodic constriction of the throat (*bell., hyos.*).

Sulphur.—Coryza with stoppage of the nose. Itching and burning in the nostrils, as if sore. Stitches in the throat when swallowing (*bell.*). Dry cough in the evening on lying down, with itching in the bronchi. Stitches in the chest extending back to the left scapula (*kalicarb.*). Sudden arrest of breathing when turning in bed. Chronic cough with mucous rales. Chronic discharge from the ears with hardness of hearing. Chronic diarrhea.

Tartar emet.—Chilliness with sneezing, fluent coryza, and loss of taste and smell. Much rattling of mucus in the chest (*ipccac.*). Cough followed by yawning (*mex.*), especially in children. Gastric symptoms. Cyanosis (*cuprum*).

Veratrum alb.—Difficult respiration with tightness and constriction in the chest. Deep, hollow cough, occurring in shocks. Icy coldness of the forehead, nose and extremities. Tardy and pale livid eruption. Frequent, weak, intermittent pulse. Sudden sinking of strength (*ars.*). Capillary bronchitis (*bry., chel., tartar emet.*).

Veratrum vir.—Severe frontal headache with vomiting. Restless sleep with dreams of being drowned. Yellowish or whitish coating on the tongue with a red streak down the center. Violent nausea and vomiting with pain in the epigastrium. Irregular, hard, frequent pulse. The heart beats rapidly when turning over in bed (*bell.*). Oppression of the chest with slow, labored breathing. Convulsions before the eruption.

HYGIENIC AND DIETETIC TREATMENT.

The patient should be put to bed and kept in a warm and even

temperature of between 65° Fahr. and 70° Fahr., until the disappearance of the eruption. The room should be moderately darkened and well-ventilated, care being taken to avoid all draughts. Quietude and absolute cleanliness should be insisted upon.

When the skin is dry and hot, frequent, warm, carbolized sponge baths, followed by careful drying, may be of service. Cold bathing should be sedulously guarded against for fear of pulmonary complications. Night and morning inunctions with mildly carbolized cosmoline, almond oil, or a piece of warm, fat bacon (previously soaked in water to remove the salt), tend to reduce the fever and diminish the danger of communicating the disease. The ophthalmia, when marked, may be relieved by simple warm water or milk and water lotions, or by an ointment of veratria (veratria five to seven grains, simple cerate one ounce). Vapor inhalations are of service when laryngeal symptoms are prominent. The lung complications may require the application of warm poultices to the chest.

The *diet* should be light and unstimulating. Chicken broth, milk, milk and arrowroot, and warm drinks should be given at first, until the eruption begins to fade. Cool drinks in *small quantities*, may be allowed if desired. When symptoms of exhaustion threaten, either brandy or sherry wine and egg (prepared by beating up a raw, fresh egg, and stirring with it one tablespoonful of brandy or two tablespoonfuls of sherry wine), or beef essence (p. 190), may be needed.

During convalescence, to avoid taking cold, warm clothing, with flannel next to the skin, should be worn. Patients should remain indoors as long as the stage of desquamation or the cough lasts.

LECTURE XXVII.

German Measles.

Definition.—German measles is an acute, contagious, eruptive disease of a benign nature, occurring in general or limited epidemics. It is characterized by irregular, slightly elevated, hyperæmic, pale rose red blotches, varying in size from a pin's head to a split pea, which, as a rule, appear suddenly, and in light cases disappear within two or three days, usually with but slight desquamation. It is attended by slight sore throat, slight coryza, and but little constitutional disturbance. Its average duration is from five to seven days. Second attacks are exceedingly rare.

Synonyms.—Rötheln. Hybrid measles. Mock measles. Epidemic roseola. Rubeola nothia. Scarlatina morbillosa. French measles. Hybrid scarlatina.

History.—German measles was first described by German writers in the early part of the present century, under the name of "*rubeola*," by which name it is still known in Germany.

Cases are reported as having occurred in Boston in 1845, in New York in 1873–74, in Philadelphia in 1875, and in Germantown, Pa., in 1878.

A wide-spread epidemic occurred in 1880–81, and extended throughout nearly all the states of this country. During this epidemic the disease prevailed extensively in New York, Chicago, Philadelphia and other large cities.

Etiology.—The nature of the morbid agent of german measles is unknown. Though contagious, it is not as much so as is that of either measles or scarlet fever. High temperatures are supposed to favor its development.

The disease belongs essentially to childhood, though it affects all ages. According to statistics, it is much more prevalent among females than among males. Its type is not constant but varies greatly in different epidemics. It affords no immunity from either measles or scarlet fever, and but rarely recurs

Clinical History.—The clinical history embraces a description of the premonitory stage, the eruptive stage and the desquamative stage.

The Premonitory Stage.—In mild cases after an incubation of about fourteen days, the disease is ushered in with the eruption. In severe cases a premonitory stage, which is of from twenty-four to thirty-six hours duration, and is marked by shivering, febrile disturbance, headache, sore throat, pain in the back and limbs, and in some instances by nausea, short cough, sneezing and coryza precedes the appearance of the eruption.

The Eruptive Stage.—The eruption consists of pale red or rosy elevated spots, which vary in size from a pin's head to a split pea or larger. It usually appears upon the face, neck, and trunk, and sometimes upon the arms and thighs. At times, the pale rose red color is perceptible beyond the line of the lesions, in the form of a delicate halo. When large, the spots are generally distinct, and are seldom arranged in crescentic outline. When small, they may be so densely crowded together as to resemble the eruption of scarlet fever. They are oftener confluent upon the face than upon any other part of the body, and frequently occasion intense itching. After remaining visible from one to two or three days, they rapidly fade and disappear.

The constitutional symptoms which attend the appearance of the eruption are usually slight. Sneezing and coughing are not infrequently present. Suffusion of the eyes with injection of the conjunctiva is rarely observed. The temperature seldom rises above 100.5° Fahr. or 101.5° Fahr. In severe cases it may reach 102° Fahr. or even 104° Fahr. Defervescence usually begins on the second day of the fever, and may take place suddenly—by *crisis*, or gradually—by *lysis*. The pulse usually follows the temperature. The fauces are generally somewhat congested, and the tonsils may be moderately swollen. The tongue is usually covered with a whitish coating, through which a few red and enlarged papillæ can be seen, especially at the tip. Moderate

CHART XIX.—*German Measles.*

Nature:	Epidemic. Moderately contagious.		
Incubation:	Ten to fourteen days.		
Stages:	Premonitory.	Eruptive.	Desquamative.
Duration:	24 to 36 hours.	One to three days.	One to three days.
Eruption:	Appears on 2nd day.	Pale rose red, pea-sized patches First on back and chest.	Small scales. Slight brown stains.
Throat;	Slight sore throat.	Enlargement of glands behind sterno-mastoid muscle.	Sore throat gradually disappears.
Head:	Headache	Slight headache.	CESSATION OF SYMPTOMS AMELIORATION OF SYMPTOMS.
Tongue:	Furred. Marginal papillæ enlarged.	Coated white.	
Stomach:	Nausea. Anorexia.		
Extremities:	Pain in back & limbs.		
Pulse:	Accelerated.		
Respiratory tract.	Occasionally catarrhal symptoms Dry, hacking cough		
Eyes:	Slightly suffused.	Slightly injected.	
Temperature:	100° to 102°. Highest on 1st day.	Usually declines on 2nd day of disease.	Defervescence by either crisis or lysis.
Urine:	Usually normal. Chlorides in excess.		
Prognosis:	The prognosis is always favorable.		
Duration:	Five to seven days.		
Recurrence:	One attack is protective against recurrence.		

swelling of the cervical and post-cervical glands occurs in most cases.

The Desquamative Stage.—The eruption commonly fades in from one to two or three days, and may or may not be followed by fine branny or furfuraceous desquamation. The fading eruption sometimes leaves a slight brown stain, which gradually disappears.

Duration.—The average duration of german measles is from five to seven days.

Morbid Anatomy.—The eruption constitutes the principal anatomical lesion of german measles. It is characteristically fugitive in character, and rarely remains visible longer than twenty-four or forty-eight hours. Exceptionally it continues visible for three or four days. Twelve hours is the limit of its most marked development.

The irregular, light-red spots or hyperæmic blotches are due to capillary hyperæmia of the papillary layer. They are usually distinct; not infrequently they are crowded together, as on the face and trunk. As they disappear, very faint and transient pigmentations may remain, and minute epidermic scales may be shed. Occasionally, vesicles resembling miliaria make their appearance upon the hyperæmic spots, especially upon the back.

Differential Diagnosis.—The differential diagnosis of german measles is usually unattended with difficulty, when the history of the case is taken into consideration. The only diseases with which it may be confounded are scarlet fever, measles and roseola.

The chief characteristic points between *german measles*, and *scarlet fever* and *measles*, are shown in the accompanying table.

MEASLES.	GERMAN MEASLES.	SCARLET FEVER.
Highly contagious.	Moderately contagious.	Very contagious.
Incubation, 7 to 14 days.	Incubation, 10 to 14 days	Incubation, 4 to 7 days.
Stage of invasion, 3 days.	Appearance of rash often the first symptom.	Stage of invasion, 2 days.
Eruption consists of papules, arranged in crescentic patches.	Eruption consists of pea-sized, slightly raised patches.	Eruption consists of minute red points, on a bright red hyperæmic ground.

MEASLES.	GERMAN MEASLES.	SCARLET FEVER.
Dull, raspberry red color.	Pale, rose red color.	Bright red color.
First appears on forehead and face.	First appears on back and chest.	First appears on neck and chest.
Duration of eruption, 3 days.	Duration of eruption, to 3 days.	Duration of eruption uncertain.
Slight sore throat. Dark red spots on palate.	Slight sore throat.	Inflammation of throat.
Glands of throat not enlarged.	Enlargement of cervical and post-cervical glands	Glands of throat enlarged and painful.
Tongue furred white.	Tongue slightly furred.	Strawberry tongue.
High fever, with general catarrhal symptoms.	Slight fever, with or without catarrhal symptoms.	High fever, hot skin, rarely with catarrhal symptoms.
Cerebral symptoms rare.	Cerebral symptoms absent.	Cerebral symptoms frequent and grave.
Slight, branny desquamation.	Slight desquamation in small scales.	Copious desquamation in large flakes.
Recurrences are rare.	Recurrences are rare.	Recurrences are rare.
Affords no immunity from german measles.	Affords no immunity from measles or scarlet fever.	Affords no immunity from german measles.

From *roseola*, german measles may be distinguished by the absence of coryza in the latter, and by the glandular enlargement which occurs in the former. German measles is, *roseola* is not, contagious.

Prognosis.—The prognosis is always favorable.

Treatment.—The treatment consists largely in regulating the diet, and in protecting the patient against premature exposure. Tepid sponging is useful in allaying the annoying itching, and as the eruption fades, inunctions of the surface prove beneficial.

Aconite is almost the only remedy required. *Belladonna* may be of service if the throat symptoms become marked. *Kali bich.* will be needed when hoarseness, cough, and catarrhal symptoms are present. *Mercurius* may be used for the swelling of the glands; and *sulphur* during desquamation. (For leading indications, consult the treatment of measles and scarlet fever.)

LECTURE XXVIII.

Scarlet Fever.

Definition.—Scarlet fever is an acute, epidemic, contagious, eruptive fever, produced by poisonous emanations—containing *plax scindens*—from an infected individual, characterized by a scarlet red rash on the body and extremities, accompanied with fever and an inflammation of the throat. It runs its course in from seven to ten days, and ends by desquamation, which usually lasts about two weeks. It chiefly affects children, and usually occurs but once in the same person. The incubation varies from three to eight days.

Synonyms.—Scarlatina (from “scarlatta,” a red-colored cloth). Febris anginosa. Fothergill’s sore throat. Garotillo.

History.—Scarlet fever is supposed to have invaded the world soon after small-pox and measles. The first record is of an epidemic angina with scarlet eruption, which raged in Spain in 1610, and extended to Italy in 1618.

It appeared in Germany about 1625, and was first described in England by Sydenham, who established its specific nature in 1676. In its mild form it first reached Scotland in 1680. Morton described it as appearing in London in 1689.

In 1735, it made its first appearance in this country at Kingston, about fifty miles from Boston. Like most new diseases, it baffled, for a time, every attempt to check its progress.

In 1747–49 a severe epidemic prevailed in London, and spread to Plymouth in 1751–53.

In 1778, an epidemic devastated Birmingham.

It first appeared in Iceland in 1827, in South America in 1829, in Greenland in 1847, and in Australia in 1849.

During the last twenty years it has prevailed in more or less extended epidemics in this country.

It appears to prevail to an unusual degree every fifth year.

Etiology.—The causes of scarlet fever are, predisposing and exciting.

1. *The Predisposing Causes.*—The season of the year appears to exert some influence. The disease may prevail at all seasons, but is most frequent in spring and summer; next in autumn, and lastly in winter.

Age is of great importance among the predisposing causes of scarlet fever. The greatest susceptibility is between the ages of three and five years. Children under two years, and infants at the breast, though by no means insusceptible, are rarely affected. After the fifth year the liability rapidly diminishes and becomes very small after forty.

Sex exerts little influence as a predisposing cause. Statistics show a marked preponderance in the number of males attacked during the first ten years of life. After fifteen years of age, females are more susceptible than males. As contrasted with measles, scarlet fever is generally lighter in proportion to the age of the patient.

2. *The Exciting Cause.*—The real nature of the scarlet fever poison is no longer unknown. Eklund's discovery of minute organisms—*plax scindens*—in the blood and urine of scarlatinous patients, threw a flood of light upon this subject. Since the announcement of his discovery, other microscopists have found by systematic examination of the blood and urine of scarlet fever cases, that these micro-organisms are constantly present in, and peculiar to, the fluids of this disease. As contained in the urine, Dr. Eklund describes the *plax scindens*, as consisting of flat, oval or rounded, colorless or yellowish-white sporoidal cells, having a distinct cell wall, and a clear brownish-colored nucleus. As a rule, they are found free, and never arrange themselves either in swarms or in rows as do ferments. They multiply by binary fission, and frequently exhibit rotary or screwing motions.

Up to the present time *plax scindens* have not been found in any other fever. The conclusion is inevitable that this parasite has to do with the causation and development of scarlet fever; or, in other words, that it constitutes the contagion of the disease.

The contagiousness of scarlet fever is clearly demonstrated by both clinical observation and experimental inoculation. Miquel, Stole and Williams have succeeded in artificially infecting healthy individuals by inoculating them with either the blood or the epidermic scales taken from scarlatinous patients. These inoculations were followed not only by the characteristic febrile eruption, but were more severe than the ordinary disease, and appeared to confer a certain degree of protection from reinoculation.

The period at which the disease is most contagious is at the height of the fever, when the parasite is found in greatest quantity in the urine. It may also be conveyed during the desquamative period in the epidermal scales. The atmosphere may be contaminated not only by the air exhaled by scarlet fever patients, but also by the secretions, especially the urine. The distance to which the poison may be carried by the air does not exceed a few feet. It enters the system mainly by the lungs, although drinking milk which has been diluted with water, probably containing *plax scindens*, may cause the disease. The most frequent mode of infection is by breathing the air of a room occupied by a scarlet fever patient. It may also take place without direct communication, and persons may carry scarlet fever to others without becoming affected themselves. In order to thus convey the poison it is necessary that the clothing become thoroughly saturated with it, and physicians in simply making their daily visits are in no danger of carrying the disease. It retains its vitality for a long time, and may attach itself to clothing, bedding or furniture, which act as *fomites*.

The contagion of scarlet fever is less tenacious than that of either measles or small-pox. Prolonged exposure to moderately dry heat (204° Fahr.) destroys it.

The period of *incubation* is shorter than in the other eruptive fevers, and varies from two to ten days. Its average duration is from four to seven days.

Immunity from a second attack is enjoyed by a majority of persons who have suffered from scarlet fever. Nevertheless, many cases of well-marked second attacks are recorded. Secondary or tertiary attacks are rarely fatal.

The *lower animals*, especially the cat, dog, horse and hog, are liable to have scarlet fever. Many cases occurring in the human

subject, and heretofore supposed to have originated *de novo* or independent of infection, were probably due to transmission of the disease from these animals.

Forms.—Scarlet fever may be either mild or severe.

1. The *mild* or *ordinary form* represents the general course of the disease, and will be fully described in the clinical history.

2. The *severe* or *malignant form* is characterized either by the extreme gravity of the throat symptoms, or by the early involvement of the cerebro-spinal system in consequence of some peculiarity of the morbid agent, high temperature, septic or uræmic poisoning, or extreme susceptibility of the organism.

Clinical History.—The clinical history embraces a description of the stage of invasion, the stage of eruption, and the stage of desquamation.

The Stage of Invasion.—The prodromal stage or stage of invasion is usually ushered in suddenly, by a chill or chilliness, alternating with burning heat, followed by a rapid rise in temperature, which often reaches 104° Fahr. within twelve hours.

The skin becomes exceedingly dry and pungent, the face flushed, and the pulse rapid and bounding. Pain in the head, vomiting and thirst are early and prominent symptoms. The tongue is thickly coated white, the filiform papillæ are enlarged and project through the coating, and the whole presents the appearance of a white strawberry. There is a diffuse redness of the pillars of the fauces, uvula and tonsils, with slight soreness of the throat. The eye assumes a peculiar brilliant and glistening stare. In children there may be syncope, delirium or convulsions. The average duration of this stage is from twelve to twenty-four hours; it may be prolonged to four or five days.

The Stage of Eruption.—Usually, on the second day of the fever an eruption appears about the neck and clavicular regions, and extends rapidly—within ten or twelve hours—over the entire surface of the body. It is first seen as minute red dots or specs, which vary in size from a line to a line and a half in diameter. These dots, which are not elevated above the surface, run together and form patches which rapidly coalesce.

After the second day of the eruption, the whole cutaneous surface presents a bright rose red appearance in mild cases, and a deep red or 'boiled lobster' appearance in severer cases. The

rash is usually most intense upon the back and loins. Upon the extensor surface of the limbs it is often developed in punctate form, and imparts to the skin a certain degree of roughness. The redness which momentarily disappears on pressure, rapidly returns from the *periphery to the center* of the spot, the instant the pressure is removed. As the eruption becomes fully developed, the skin, especially on the face, hands and feet, appears slightly swollen. Frequently there is more or less itching and burning over the entire surface. The eruption usually attains its maximum of development upon the evening of the fourth day and remains visible six days. In extremely mild cases it may not last longer than two or three days.

The febrile and other symptoms which preceded the eruption persist unabated, and are often augmented. The temperature may continue to rise until it has reached 106° Fahr. or 107° Fahr.—usually not higher than 103° Fahr. or 105° Fahr. The pulse is quick, full and vibratory, and ranges from 120 to 140 or even 160 per minute. Vomiting becomes more severe and is projectile in character. Thirst is usually urgent and anorexia is generally present. The skin is dry, and the heat is intense and pungent. The condition of the fauces is characteristic. In some very mild cases, there is simply redness over the tonsils, pillars of the soft palate and uvula. In most cases there is more or less parenchymatous inflammation of the tonsils with general tumefaction of the soft parts of the throat. Occasionally ulceration of the tonsils takes place. Not infrequently the glands about the neck are somewhat swollen and tender. The tongue, which early in the disease is generally coated, may shed its coating and appear clean and reddened, the enlarged papillæ giving to it the so-called “strawberry” or “cat’s tongue” appearance. The urine is scanty and turbid, often high-colored, and is deficient in chlorides; occasionally it contains albumen and bile pigment. Not uncommonly there is some delirium, especially at night. The duration of this stage varies from four to six days; it may be prolonged to eight or ten days. Usually from the fifth to the eighth day of the eruption, as the rash fades, —leaving a brownish-yellow pigmentation of the surface—the temperature begins to decline, the pulse lessens in frequency, the redness and swelling of the tonsils diminish, the throat symptoms abate, and the tongue gradually returns to its normal state.

The Stage of Desquamation.—Desquamation often commences with the decline of the eruption, and is usually slight or extensive in proportion to the intensity and diffusion of the rash. It commences first on the neck by a loosening of the epidermis in the form of thin, light scales, and gradually extends over the whole body. On the extremities it is frequently exfoliated in large flakes. Occasionally the cuticle of the hands and feet is detached entire. The hairs may be simultaneously shed. The mucous membrane also participates in the exfoliating processes. During this stage the urine becomes abundant and pale, and often contains albumen. The period of desquamation lasts from ten to sixteen days, at the end of which time if neither complications nor sequels occur, the patient is convalescent.

Duration.—The duration of scarlet fever in uncomplicated cases, is from two to four or six weeks.

Severe or Malignant Scarlet Fever.—The severe or malignant form of scarlet fever is usually marked by irregularities in the manifestations of the disease. In some cases the symptoms set in suddenly and are of a most violent character. In others, grave symptoms do not appear until the third, fourth or fifth day. In the majority of instances more or less severe and dangerous symptoms develop during or immediately following the onset of the attack.

In one class of cases, marked by early high temperature, there is not much swelling of the throat, nor very marked increase in the frequency of the pulse, but on the second day of the eruption the thermometer in the axilla registers 107° Fahr. or 108° Fahr.

In another class of cases, the throat symptoms are prominent from the onset of the attack. The fauces are of a deeper color and more swollen than in the ordinary form, and there is more difficulty in swallowing. Whitish or yellowish ash-colored points or patches appear upon the soft palate and tonsils. These membranous spots may remain from one to three or four days and then disappear, or they may form in successive crops. The mucous membrane underneath may be red and swollen, or even softened and ulcerated. There is usually more or less fetor of the breath. Occasionally the tonsils are enlarged, infiltrated with pus and softened. The pharynx may appear ulcerated, and

in very malignant attacks may present evidences of gangrene. Inflammation and swelling of the sub-maxillary lymphatic glands and surrounding cellular tissue almost invariably occurs. In favorable cases the enlargement and induration of the glands disappear in from three to twelve days, in others it terminates in suppuration. Purulent or membranous coryza and often otorrhœa, which is apt to result in permanent deafness, are present.

In still another class of cases the patient may perish shortly after the onset of the attack, and before the eruption appears, exhibiting comatose or convulsive symptoms, from the overwhelming of the cerebro-spinal system with the scarlatinous poison. Or the eruption may partially appear and then recede or assume a livid, hemorrhagic or petechial type, and be followed by albuminuria, diarrhea, coma and death.

Either septic or uræmic poisoning may cause a case of scarlet fever, which has been running a benign course, to suddenly assume a malignant type. The uræmia in such cases is due to the development of scarlatinal nephritis, and the septic poisoning is due to a septic element in the ichorous discharges from the nostrils, or to a septic poison developed during the suppurative process which occurs when immense cervical abscesses are formed.

The general symptoms are of necessity more severe in malignant than in ordinary cases. The fever is usually intense, although in hemorrhagic cases the temperature is not always specially high. There is great restlessness with depression of strength, and a decided tendency to delirium and stupor; at times stupor or coma may alternate with convulsions. The respirations are accelerated, and the pulse ranges from 140 to 150 or even 170 beats per minute. In most instances, especially if throat symptoms are pronounced, a loud gurgling noise is heard in the throat when the patient is asleep or dozing. Nausea and vomiting are usually prominent. In severest cases there may be diarrhea. The face is deeply flushed and anxious. Laryngitis not infrequently occurs, evidenced by frequent, hoarse or croupal cough, aphonia and dyspnœa with stridulous respiration. Usually within four or five days, if no improvement takes place, the patient lapses into a typhoid condition and dies in from three to ten days.

The duration of severe or malignant cases of scarlet fever is uncertain. Life may be destroyed in a few hours or the patient may linger for several days, sometimes for two, three or even six weeks. The average duration is from eighteen hours to five or six days.

Irregularities.—At times the eruption appears first upon the extremities and trunk, and afterwards about the neck and clavicular regions. It may be either short lived or unusually prolonged. Miliary papules, minute vesicles or purpuric lesions may appear upon the affected surface. Occasionally, during the prevalence of scarlet fever epidemics, the only local manifestation of the disease is the sore throat, no eruption appearing. Such cases have been termed *scarlatina sine eruptione*, and are capable of imparting the regular form of the disease to others. Another irregularity consists in the development of an eruption without fever or throat symptoms. Some writers, with doubtful propriety, make mention of a *latent scarlet fever*, which is marked by the absence of throat, cutaneous and febrile manifestations, the only evidence of the occurrence of the disease being the appearance of the characteristic sequels.

Occasionally during desquamation, the skin of the chest appears reddened and hyperæmic. Not uncommonly during convalescence a mottled rash, due to the escape of coloring matter into the surrounding tissue, appears upon the legs and lasts only a few days. Constitutional symptoms seldom attend these rashes.

Sometimes, as late as four weeks after the first appearance of the eruption, in consequence of some septic condition, a soreness of the throat with injection of the fauces reappears, accompanied by albuminuria and the development of a chest rash, which lasts from twelve hours to two or three days.

Complications and Sequels.—The most common sequel of the disease is *scarlatinal dropsy*. It attacks mostly the sub-cutaneous tissues, when it is known as *anasarca*. Not infrequently it affects the serous cavities and the internal organs, and causes cedema of the lungs, ascites, hydrothorax, hydropericardium or hydrocephalus.

Anasarca is present in about one-fifth of all cases, and usually occurs in the course of the second or third week of the disease, during the process of desquamation, or just as desquamation is

being completed. It follows moderate oftener than severe cases, and is produced by changes in the kidneys, mainly induced by some peculiarity in the scarlet fever poison, although commonly believed to be due to the influence of cold. It first shows itself in the face, and is most marked about the eyelids. From the face it extends over the body, and if it becomes general is apt to be attended by more or less ascites.

Frequently for two or three days before the occurrence of the anasarca, the patient is restless and sleepless, and complains of pain in the head, anorexia, nausea and vomiting. The skin becomes hot and dry, and the temperature is raised two or three degrees. The urine is high-colored and scanty, and if examined will be found to contain albumen and exudative casts.

In mild cases after the anasarca has continued for two or three days it begins to decline, the general symptoms disappear, and the urine returns to normal. In more severe cases it is apt to become extensive and may remain for a week or ten days. In violent cases it steadily increases, puffiness of the face and cedema of the limbs become more and more marked, the temperature steadily rises, and the urine becomes scanty or is entirely suppressed. If the disease is not removed, the effusion may extend to the serous cavities and internal organs. Death may occur from coma sometimes preceded by convulsions, due to uræmia, from asphyxia occasioned by cedema of the lungs or hydrothorax, or from hydrocephalus.

Oedema of the glottis is a dangerous complication. It not infrequently occurs in connection with extensive suppuration of the glands and areolar tissue about the neck. *Abscesses about the throat* are not uncommon in scrofulous subjects.

Diphtheria is a not very rare complication. It usually appears suddenly, and is characterized by the pathognomonic exudation and attendant depression of the disease. It may develop at any period of the fever, but generally occurs during desquamation. Its advent is of serious import, as it usually terminates fatally.

Bronchitis and *pneumonia* are rare complications. *Pleuritis* is quite common.

Endocarditis is the most common inflammation of the serous membranes, occurring as a complication of scarlet fever. It is usually *ulcerative* in character, and may give rise to either septicæmia or embolism.

Pericarditis may occur, but is not as frequently observed as is endocarditis.

Peritonitis is a rare complication. When it does occur, it is apt to be sub-acute.

Gastro-intestinal disorders are not uncommon. When severe or long continued, they may prove dangerous.

Catarrhal and *parenchymatous nephritis* are important and justly dreaded complications during the stage of desquamation.

Rheumatism, of an inflammatory character, sometimes occurs during the desquamative period. It usually travels rapidly from one joint to another, and seldom lasts longer than four or five days. *Suppurative synovitis* is recorded among the occasional sequels.

Phlyctenular conjunctivitis is the most frequent eye complication. *Paralysis of the ciliary muscle*, and loss of power of accommodation sometimes occur as a sequel. Occasionally *destruction of the cornea* occurs, as a result of severe keratitis.

Otitis is a not uncommon sequel. It may be either external, middle or internal, and is generally due to the extension of the inflammation up the Eustachian tube. Sometimes it terminates in ulceration and destroys the tympanum, and even the ossicles, and may induce caries of the mastoid process of the temporal bone. It is apt to be associated with more or less permanent deafness, and may prove fatal by the eventual production of meningitis or even abscess of the brain.

Chronic and purulent nasal catarrh, which may result in caries of the nasal bones, is a not uncommon sequel.

Chorea occasionally appears during convalescence.

LECTURE XXIX.

Scarlet Fever.—(CONTINUED.)

ANALYSIS OF CHART.

The Nervous System.—A chill or chilliness is an initial symptom in some cases of scarlet fever. Frequently, however, it is absent or but feebly marked.

Headache occurs among the earlier symptoms. It is often only moderately intense, sometimes it is slight. Rarely, it augments during the eruptive stage. Generally it terminates upon the advent of delirium.

Pains in the back and limbs are prominent symptoms during the early days of the attack. There is frequently some tenderness about the joints.

Delirium, manifested by incoherency, is present in all severe cases. Occasionally in malignant cases delirium and coma usher in the disease. Active delirium, carphologia and subsultus tendinum, characterize severe cases.

Restlessness, jactitation and sleeplessness, are apt to be more or less marked.

Drowsiness, verging gradually into coma, often exists in severe cases from the start.

Great debility is an early symptom in malignant cases. It not infrequently remains as a sequel in other cases.

Coma occurs in by far the greatest number of fatal cases, and is generally the forerunner of death. In violent cases it frequently alternates with convulsions. Occasionally coma appears suddenly in consequence of embolism of one of the cerebral vessels, in patients who before this occurrence appeared to be doing well.

CHART XX.—*Scarlet Fever.*

Nature:	Epidemic. Contagious. Portable.		
Incubation:	Three to eight days.		
Stages:	Invasion.	Eruption.	Desquamation
Duration:	12 to 24 hours.	Four to six days.	10 to 16 days.
Skin:	Dry, pungent heat.	Fine scarlet rash. First on neck and clavicles. Itching.	Scales or flakes. Itching
Temperature:	103° to 104°.	103° to 105° or 107°.	Gradual defer- vescence.
Pulse:	100 to 120 or 140.	120 to 140 or 160.	Returns to normal
Throat.	Sore throat, Redness of tonsils, palate and uvula.	Inflammation of tonsils. Ash-colored exudation. Swelling of external glands.	RESIDENCE OF SYMPTOMS.
Nervous System:	Pain in the head. Con- vulsions.	Headache. Nocturnal delirium	
Stomach:	Nausea and vomiting.	Projectile vomiting. Thirst.	
Tongue:	White coating.	Strawberry tongue.	
Urine:	High colored.	Scanty, Dark. Contains plax scindens, often al- bumen and casts.	Abundant and pale. Contains albumen and casts.
Eyes:	Brilliant and glistening.	Conjunctivitis.	Eye and ear sequels.
Ears:	Normal.	Otitis	
Complications and Sequels:	Anasarca. Dropsy. Inflammation of serous membranes. Rheumatism. Eye and ear lesions. Diphtheria.		
Duration:	From two to four or six weeks.		
Recurrence:	Scarlet fever seldom recurs		
Age:	Mostly from two to five years.		

Convulsions often usher in the attack in children.

Paralysis is not of common occurrence.

Cases that begin with violent nervous phenomena, and are afterwards characterized by the appearance of severe throat symptoms, usually terminate fatally.

The Temperature.—In all cases of tolerably severe scarlet fever the temperature rises rapidly, and may reach 103° Fahr. or 104° Fahr. within a few hours. It increases, as a rule, with the appearance of the eruption, and remains between 104° Fahr. and 106° Fahr. until the rash begins to decline. At times it is hyperpyretic, and reaches 107° Fahr. or 108° Fahr. on the second day. It runs high in malignant cases, and has been known to exceed 112° Fahr. in fatal cases.

Defervescence is frequently irregular and may be delayed by complications. The temperature-fall dates from the decline of the rash, and generally requires from three to eight days for its completion. Exceptionally, after a moderate exacerbation, it reaches the normal in twelve hours. Occasionally it takes the zigzag descent of lysis. A sub-normal temperature sometimes sets in before the normal is rendered certain. In some cases the temperature pursues a descending course while all the severe constitutional symptoms continue; the patient dies whilst the temperature falls still lower, or undergoes fatal perturbations. Its descent may be interrupted by renewed exacerbations, usually traceable to some complications. In typhoid states it may remain high for ten days or two weeks after the fading of the rash.

During convalescence it remains normal unless elevated by complications. In fatal cases, if death occurs during the stage of eruption, the temperature ranges high until death approaches when it generally falls. If death takes place during the decline of the eruption, the temperature may either rise or fall in the death agony.

The Pulse.—The frequency of the pulse is a marked symptom in scarlet fever. It frequently reaches 120 or 140 soon after the onset of the attack, and is full and compressible. In severe cases it may run up to 150, 160 or even 170. As the disease progresses towards a fatal termination it becomes small and very rapid, and is often uncountable.

The Respiratory System.—The respirations are generally

natural, although when the fever runs high they are somewhat quickened. A frequent, guttural, dry cough is often present. In severe cases the respirations become accelerated. As a result of the throat affection they become labored and difficult, and are performed with a noise like that of one strangling. From this circumstance is derived the Spanish name for the disease, *garotillo*. The voice is apt to be hoarse, and in severe cases may become whispering or lost, in consequence of extensive exudation into the larynx.

The Throat.—Sometimes a feeling of roughness in the throat with pain during deglutition is the first intimation of the approach of the disease. Exceptionally, in the mildest cases, there may be no pain in swallowing, but little redness over the tonsils and soft palate, and no inflammation or swelling of the throat. In most cases, however, there is more or less swelling of the tonsils, and general tumefaction of the soft parts of the throat. As the eruption progresses, the fauces become more swollen, the redness of the mucous membrane deepens, the tonsils become the seat of more or less intense parenchymatous inflammation, and are frequently spotted with a white or ash-colored exudation. This exudation differs from that of diphtheria in adhering less closely, in being ash-colored instead of yellow, in appearing upon a uniformly reddened mucous membrane instead of a simply circumscribed redness, and in not coming off in dense membranous layers. The exudative spots may remain from one to three or four days, and are then thrown off permanently. Occasionally they form in successive crops. Hawking and spitting are apt to be troublesome on account of the collection of mucous in the throat and fauces. Retor of the breath is more or less pronounced, according as the exudation is slight or extensive.

In severe cases the exudation may become dark and offensive, and leave deep, ragged, ashy-looking ulcers on the throat and tonsils. Inflammation, swelling and induration of the lymphatic glands and cellular tissues about the angle of the jaw and under the chin are almost constant accompaniments. The tumefaction may extend to the sides of the neck and throat, and greatly embarrass respiration. In such cases there is great danger of oedema of the glottis. Extensive suppuration in the glands and areolar tissue about the neck sometimes occurs. Sloughing pharyngitis not infrequently occurs in the worst forms. In malignant at-

tacks there may be evidences of gangrene of the pharynx and uvula.

The Cutaneous Surface.—The skin becomes hot and dry, and the face flushed shortly before the onset of the attack. The heat is usually pungent in character, and the integument is slightly swollen. An indescribable odor—likened by some to that of old cheese—readily discernable when once recognized, often attaches to the scarlet fever patient, and is an important aid in diagnosis. More or less itching and burning attends the cutaneous congestion, and increases in intensity as the disease progresses.

The *eruption* appears on the second day of the fever and constitutes the characteristic clinical phenomenon of the disease. It appears first about the neck and clavicular regions, and extends rapidly over the trunk and extremities. It frequently spares the face, and the skin about the mouth is usually pallid. The first appearance is in the form of fine red dots or points. These dots form irregular patches of considerable size, which quickly coalesce, and give to the skin a distinctly scarlet color. In malignant cases the rash comes out late, and is either pale and indistinct or dark and livid. In rare instances it is wholly wanting. In mild cases it is frequently of short duration and occurs only in patches which do not coalesce. It reaches its height about the fourth day, and then remains stationary for one or two days, after which it begins to decline. It is most vivid and remains longest upon the back, loins, inner surfaces of the arms and thighs, and flexures of the joints. The surface of the eruption is usually smooth; but in some cases, particularly upon the extensor surfaces of the extremities, on account of the enlargement of the papillæ it is slightly roughened. Occasionally minute miliary vesicles are scattered over the surface.

Desquamation usually commences about the sixth day, first upon the neck, and then gradually extending over the body. Where the skin is thin, the epidermis comes off in thin, light scales. Where it is thick, as on the palms and soles, it peels off in large flakes. As the rash fades it leaves a yellowish-brown pigmentation which gradually disappears. In severe cases the hair falls off, as in all long fevers.

The Digestive Tract.—The *tongue* is at first coated white or yellowish-white and is of a deep-red color at the tip and edges.

During the eruptive stage the coating exfoliates, and the whole surface assumes a deep red and shining aspect. The papillæ become enlarged and projecting, and cause the tongue to present the appearance of a ripe strawberry. This strawberry-like or cat's tongue is usually present in all well-marked cases, and is pathognomonic of the disease. It frequently continues for a week or ten days and then returns to normal. The tongue is usually moist throughout the attack. In malignant and fatal cases it becomes dry, brown and chapped, and sordes collect upon the lips, teeth and gums. Thirst is usually urgent, and there is complete anorexia. Nausea and vomiting occur in the majority of cases, and are more urgent during the eruptive stage. They become violent and constant in severe cases. The bowels are natural or else slightly constipated in ordinary cases. At times a slight gastro-intestinal catarrh may be present. Colliquative diarrhea and intestinal hemorrhage occasionally occur in malignant cases.

The Urine.—The urine is commonly of a deeper color than in health, and contains *plax scindens* and a large quantity of lateritious sediment. It is generally acid in reaction, and its specific gravity is higher than normal. The quantity of urea and chlorides is usually diminished. Albumen is present in over half of the cases. Renal epithelium, epithelial or hyaline casts, and blood globules, are apt to be more or less abundant in the sediment.

In severe cases the urine may be very scanty, or even entirely suppressed, and is frequently attended by uræmic symptoms. Usually whatever urine is voided is of a dark-red or blackish-brown, smoky color. The specific gravity runs high—1025 to 1040—and the amount of albumen, casts and blood globules is large. After a time, in favorable cases, the urine becomes more abundant, the smokiness and albumen disappear and the specific gravity gradually returns to normal. In less fortunate and by no means rare cases, the albumen remains constant, and the microscope shows granular or epithelial casts, and free renal epithelium.

The Special Senses.—The eye and ear are frequently involved and are often the seat of serious lesions.

Conjunctivitis may occur at any stage. Phlyctenular inflam-

mation is a not uncommon sequel. Marginal blepharitis frequently exists and is apt to become chronic. Primary keratitis may occasion perforation of the cornea. Transitory blindness often accompanies the ordinary symptoms of uræmia.

Catarrhal Eustachian deafness and external otitis are not uncommon when the rash is well marked. Acute suppurative otitis media is oftener present when the throat symptoms are prominent, and when the cutaneous manifestations are less marked.

The nasal mucous membrane is frequently the seat of an excoriating coryza, which is often associated with a dangerous form of pharyngitis. The discharge contains the elements capable of producing septic poisoning. Not infrequently it leads to the formation of ulcers, and eventually necrosis of the nasal bones.

Morbid Anatomy.—The characteristic lesion of scarlet fever is to be found upon the skin and mucous membrane. Most important changes may also be observed in the blood, kidneys, liver, spleen and lymphatic glands of the throat.

The Skin.—The morbid changes which take place in the skin are mainly those of hyperæmia and slight exudation, and are believed to be due to the irritating nature of the *plax scindens*. The hyperæmia is limited for the most part to the corium and papillary layer. In the early stages the corium presents signs of inflammatory œdema with enlargement of the papillæ, and the whole is somewhat thickened. Later the thickening becomes less marked, but local thickenings of the stratum lucidum and partial loosening of the stratum corneum are found. These changes usually take place previous to the separation of large masses by desquamation. The process of desquamation may last only a few days, or it may continue for weeks. It is not a rare thing for it to recur a second time on the same surface.

The *eruption*, which is usually referred to as the characteristic cutaneous lesion, consists of pin-head sized, closely placed points, between which the skin is of a natural color. In well-marked cases the surface is swollen and intensely congested, and presents a generally reddened appearance. The spots are mainly circular; at times they are elongated, especially on the forearms and legs. The color of the eruption varies from pale red to dark red, and is, as a rule, proportionate to the intensity of the fever. It is

a result of the congestion and inflammation of the skin, which may be presumed to be due to the irritant pressure of the *plax scindens*.

Occasionally the eruption is accompanied or followed by *acne*, *herpes* or *urticaria*. Not infrequently in malignant cases, cutaneous hemorrhages occur, which lead to the formation of *petechiæ* and extensive *ecchymoses*.

The *blood* undergoes various changes, and usually contains *plax scindens*.

The *mucous membrane* of the *tonsils* and *pharynx* is red and swollen at the onset of the disease. Soon the parts become covered with a tenacious mucus, and small elevations appear upon the reddened surface. In severe cases the secretion becomes abundant and the membrane appears dark and cedematous, and may appear more or less covered with ash-colored patches. At times the membrane becomes ulcerated and softened. In malignant cases gangrene of the *pharynx* may occur.

Inflammation of the *parotid* and *sub-maxillary* lymphatic glands, and of the surrounding cellular tissue is frequently encountered. It may terminate in resolution; not uncommonly it ends in suppuration, and may be followed by extensive destruction of connective tissue.

Purulent catarrh of the posterior nares occurs in severe cases, and gives rise to troublesome coryza.

The *eye* lesions include conjunctivitis, purulent choroiditis, retinitis and suppurating ulcers of the cornea. The *ear* lesions are puriform and are mainly located in the middle and external ear.

The *kidneys* are, next to the skin and mucous membrane, oftenest affected in scarlet fever. The mildest affection of these organs is catarrh of the uriniferous tubules, a condition usually marked by more or less extensive epithelial desquamation. Occasionally a croupous inflammation of the tubules is induced. The morbid processes commence at the malpighian bodies and extend to the uriniferous tubules. Cloudy swelling of the epithelial cells characterizes the anatomical changes during the first week. Infiltration soon takes place around the tubules, which become stuffed with these clouded and enlarged epithelial cells or with granular matter resulting from their disintegration.

Occasionally fatty degeneration of the epithelium occurs. Sometimes abscesses form in the substance of the kidney.

Moderate catarrh of the vagina not infrequently occurs.

The *spleen* is, as a rule, slightly enlarged.

The *liver* changes are similar to those of typhus fever.

Bronchial catarrh is frequently present during the early and late stages of the disease. Lobular broncho-pneumonia sometimes occurs in severe cases.

Synovitis often occurs at the commencement of desquamation, and most frequently attacks the small joints. When suppurative inflammation of the joints occurs, death may ensue from pyæmia.

The *mesenteric*, *Brunner's* and *Peyer's glands* are not infrequently enlarged and injected. Sometimes Peyer's patches present the "shaven-beard appearance" observed during the first week of typhoid fever.

Differential Diagnosis.—The positive diagnosis of scarlet fever, though impossible during the stage of invasion, is usually attended with but little difficulty after the appearance of the eruption.

The diseases with which it is most liable to be confounded are erythema, small-pox, measles, german measles, roseola, erysipelas and diphtheria.

Erythema is to be distinguished from scarlet fever by the damask rose color of the eruption, by the smaller size of the patches, by the absence of constitutional symptoms, and by its short duration.

The striking points of differential diagnosis between *scarlet fever* and *measles* and *small-pox* are presented in the following tabular arrangement:

MEASLES.	SCARLET FEVER.	SMALL-POX.
Very contagious.	Contagious.	Highly contagious.
Most common in children.	Most common in children.	Most common in adults.
Incubation variable, from 7 to 14 days.	Incubation uncertain, average about 8 days.	Incubation constant, 10 to 13 days.
Duration, 12 to 16 days.	Duration, 2 to 3 weeks.	Duration, 3 to 5 weeks.
Prodromal symptoms, lassitude, shivering, sneezing, harsh cough. Rarely vomiting.	Prodromal symptoms, shivering, nausea, vomiting, sore throat. Convulsions occasionally in children.	Prodromal symptoms, marked chill, followed by vomiting and severe lumbar pains.

MEASLES.	SCARLET FEVER.	SMALL-POX.
Eruption appears on 4th day.	Eruption appears on 2nd day.	Eruption appears on 3rd day.
Eruption consists of papules arranged in a crescentic manner on a white ground.	Eruption consists of closely packed, minute red points, on a bright-red hyperæmic ground.	Eruption consists, first of papules, then of vesicles, and on the eighth day of pustules.
Eruption appears first on forehead and face, and extends gradually downwards.	Eruption appears first on chest and neck, and spreads rapidly.	Eruption appears first upon the forehead and about the mouth.
Eruption lasts about 5 days	Eruption lasts about 7 days.	Eruption lasts from 9 to 12 days.
Skin has no peculiar odor.	Skin has an "old cheese" odor.	Skin emits a sickly odor.
Bronchitis and coryza very constant	Bronchitis and coryza	Bronchitis and coryza rare.
Sore throat rare.	Considerable sore throat.	Slight sore throat and dry cough.
Dark red, irregular spots on the palate.	Marked injection of the fauces. Tonsils enlarged and painful.	Eruption seen on the back of the pharynx.
White coated tongue.	Strawberry tongue.	Furred tongue with red edges.
Temperature, 103° to 107°.	Temperature, 105° to 112°.	Temperature, 104° to 106°.
Fever rather increased by the eruption.	Fever not relieved by the eruption.	Fever greatly relieved by the eruption.
Secondary fever absent.	Secondary fever absent.	Secondary fever always present.
Pulse, 100 to 120 or 160	Pulse, 100 to 120, 140 or 170.	Pulse, 100 to 120 or 140.
Cerebral symptoms very rare, and not severe.	Cerebral symptoms frequent and grave.	Cerebral symptoms, especially convulsions in children, frequent.
Desquamation slight and branny	Desquamation copious and in flakes.	Desquamation in scabs, crusts and thick scales.
Catarrhal pneumonia a frequent complication.	Pneumonia a rare complication. Pleurisy frequent.	Pneumonia an infrequent complication.
Sequels; chronic bronchitis, phthisis and chronic conjunctivitis.	Sequels; dropsy, conjunctivitis, deafness and glandular enlargement.	Sequels, glandular enlargements, chronic diarrhea, and diseases of the eye.
Vaccination affords no protection.	Vaccination affords no protection.	Vaccination protects.

Roseola differs from scarlet fever in the size of its papules, which are larger and more raised than the red points of the latter disease. The intervening skin between the points soon becomes injected in scarlet fever, while in roseola it usually remains natural. Roseola is not, scarlet fever is, contagious.

The distinctive symptoms of *scarlet fever* and *german measles* are arranged in tabular form upon page 402.

Erysipelas can hardly be mistaken for scarlet fever, if it is remembered that the redness gradually extends from one point, appears smooth and shining, and is usually accompanied by marked oedema of the connective tissue.

Diphtheria is distinguished from scarlet fever by the usual absence of the eruption, the brick-dust-like flush of the throat, and the strawberry tongue. The exudation which occurs upon the tonsils and pharynx in diphtheria, is usually of a dirty gray or yellowish color, resembling wetted chamois leather, while that which takes place in scarlet fever is generally whitish or ash-colored. The urine in diphtheria though frequently albuminous, as in scarlet fever, never contains plax scindens.

Prognosis.—The prognosis in scarlet fever is always uncertain at least, until after the first twenty-four hours of the eruption. It is largely influenced by the type of the prevailing epidemic, the character of the attack, the vigor and age of the patient, and the presence or absence of serious complications.

Favorable symptoms are: a fully and regularly developed rash of a bright red color, mild cerebral and throat symptoms, a pulse not exceeding one hundred and twenty beats per minute, and a temperature below 104° Fahr.

Unfavorable symptoms are: early convulsive symptoms, prolonged delirium or coma, persistent and long continued vomiting, colliquative diarrhea, a badly-developed and dark-colored or hemorrhagic eruption, early and ulcerative throat lesions, severe scarlatinal coryza, a very rapid pulse, a temperature above 105° Fahr., a dry, brown tongue, a disposition to a typhoid state, and the occurrence of any of the more serious complications.

The rate of mortality, which is inversely proportionate to the age of the patient, varies from five to twenty per cent.

LECTURE XXX.

Scarlet Fever.—(CONTINUED.)

Treatment.

Prophylaxis.—Whenever scarlet fever appears in a family, the patient should be immediately *isolated*,* in an upper room if possible. The apartment should be large, well lighted, and *well ventilated*, and the temperature should be maintained at 65° to 70°. Carpets, hangings, and all unnecessary articles of furniture should be removed from the room. Sheets should be hung up in the door and window ways, and kept constantly saturated with Platt's chlorides or some disinfecting solution. The bed and body linen should be changed daily, and immediately disinfected or baked. The discharges from the bowels and kidneys should be received into vessels charged with disinfectants. Platt's chlorides should be sprinkled on the bed and about the room. Inunctions with mildly carbolized vaseline, practiced several times daily, by preventing the dissemination of the dusty particles of the epidermis during desquamation, exert a marked prophylactic influence. Nurses, and attendants upon the sick, should not mingle with the healthy members of the family until desquamation is completed. Physicians should take a long ride in the open air after leaving the sick-room of a scarlatinous patient, before visiting in houses where there are unprotected children.

After recovery or death, the apartment should be thoroughly

* All cases of scarlet fever occurring in the county, must be reported to the County Clerk; or, in cities, to the City Board of Health.

disinfected by the burning of sulphur, or by pouring crude carbolic acid on chloride of lime, or by placing *ozonizing powders*—composed of equal parts of oxalic acid, peroxide of manganese and potassium permanganate—moistened with water, in dishes throughout the room. The bed and body linen, and all blankets and flannels that have been about the bed, should be immersed in some disinfecting solution and then thoroughly boiled or baked. The mattress, pillows and curtains, and the clothing worn by nurses, should be exposed to a high temperature (240° or 250°), and afterwards well aired before being used. After everything has been disinfected, the woodwork of the room should be thoroughly cleaned with carbolized water, the walls whitewashed, and the apartment freely aired for at least two or three days.

It is believed that *belladonna*, administered morning and evening, will either prevent the disease, or cause it to run a milder course. The *sulpho-carbolate of soda* is also recommended for the same purpose.

Principal Remedies.—The remedies oftenest indicated in the *premonitory stage* are: aconite and belladonna in mild cases; veratrum viride, belladonna, solanum, apis, ailanthus, arum, ammonium carb. and rhus in severe cases; and arsenicum, ailanthus, lachesis, ammonium carb. and camphor in malignant cases.

During the *eruptive stage* the main remedies are: belladonna and rhus in mild cases; apis, solanum, merc. bi-jod, rhus tox., arsenicum iodide, ailanthus, hyoscyamus, veratrum viride and bryonia in severe cases; and arsenicum, ammonium carb., lachesis and ailanthus in malignant cases.

In the *desquamative stage* the principal remedies are: sulphur, arsenicum and kali sulph. in mild cases; and sulphur, hepar sulph., helleborus, squills, terebinthina, rhus, asclepias syr., apis, arsenicum, baryta carb. calcarea carb., kali bich., silica and arum, in severe cases.

Belladonna is the principal remedy in the simpler forms of the fever, especially when the eruption is smooth, and is accompanied by pain in the head and soreness of the throat. It is usually given in alternation with aconite, gelsemium or veratrum viride. *Solanum* may be used instead of belladonna when the spots are large, red and livid, and when there is a tendency to convulsions, especially in teething children. *Veratrum viride*

is called for when the fever is intense, the pulse very rapid, and there is great danger of cerebral congestion. *Bryonia* is indicated if the fever sets in with an adynamic type, and especially if, in consequence of exposure to the fresh air, the eruption recedes after it is fairly out.

Apis will be of service when there is rapid swelling of the throat with sharp stinging pains, when the rash is interspersed with a miliary eruption, when with suppression of eruption there is entire suppression of urine, or when dropsy sets in with swelling of the genitals. *Ailanthus* is indispensable when the eruption assumes a livid hue, when the fever is intense and the heat pungent, and when there is a fœtid discharge from the nostrils accompanied by cracking at the corners of the mouth. It is adapted to malignant cases, and such as show extreme torpor. *Arum* is specially valuable in severe cases when the nose and mouth are sore, when the discharge from the nose is acrid and excoriating, when the lips commence to swell, and when the patient begins to pick the fingers and lips. *Arsenicum iodide* should be thought of when the discharges are irritating and corrosive, and there is swelling of the lymphatic glands, especially in scrofulous individuals. *Arsenicum alb.* is useful in malignant cases, when there is a tendency to prostration of the vital powers. *Ammonium carb.* may be needed when the eruption is faintly developed, when the tonsils are enlarged, livid, and more or less covered with an offensive, sticky exudation, and when the parotid gland, especially the right, is inflamed and swollen. *Rhus tox.* may be administered early, instead of *bryonia*, when torpor threatens, the glands become swollen, the areolar tissue becomes implicated, rheumatic pains appear, and petechiæ are formed. *Red iodide of mercury* is always indicated for ulceration with swelling of the glands of the throat, and for swelling and inflammation of the cervical glands. *Lachesis* is a remedy of the first importance when malignant throat-symptoms appear, or when, during the decline of the eruption, the disease assumes a typhoid tendency. *Hepar sulph.* is especially valuable when suppuration threatens.

Delirium is generally met by either *belladonna*, *hyoscyamus* or *stramonium*. Extreme restlessness and irritability call for *coffea*. Marked sopor with loud, slow respiration, indicates *opium*. When the eruption is suppressed or recedes, either

apis, *bryonia*, *ailanthus*, *ipsecac*, *cuprum* or *opium* will be needed. Convulsions before the appearance of the eruption are met by *belladonna*, *monotropa*, *cuprum*, *hyoscyamus* and *veratrum viride*. Convulsions during the stage of desquamation call for *moschus*, *veratrum viride* or *cuprum*. Cases that take on a typhoid tendency are usually met by *arnica*, *baptisia* or *rhus*. When diphtheria sets in, *kali bich.* and the red iodide of mercury do excellent service.

Tartar emet. or *kali bich.* may prove serviceable when the larynx and trachea are involved, and there is great difficulty in breathing. *Ipecac* should be thought of if the chest is seriously affected, or if nausea and vomiting are leading symptoms. *Spongia* or *bromine* will be of service for the laryngitis. *Tartar emet.* for pericarditis. *Mercurius*, *bryonia* or *rhus* for pleuritis. *Arnica*, *rhus* or *salicylic acid* for articular rheumatism. *Arsenicum*, *phosphorus* or *rhus* if petechiæ and ecchymoses appear. *Arsenicum* or *veratrum alb.* for diarrhea. *Mercurius cor.* for bloody stools. *Camphor* when symptoms of collapse occur in malignant cases.

Helleborus is the principal remedy for anasarca, and for threatened hydrocephalus. *Apis*, *arsenicum*, *benzoate of lithia*, *cantharis*, *digitalis*, *helleborus*, *asclepias syr.*, *squills* and *terebinthina* are oftenest indicated in post-scarlatinal dropsy. *Hepar sulph.* will exert a favorable influence upon the tendency to dropsy if given as soon as there are traces of albumen in the urine.

Muriatic acid or *aurum mur.* will be needed when the nose is sore and bleeds frequently. *Rhus* or *mercurius nit.* for phlyctenular conjunctivitis, suppurative choroiditis or panophthalmitis. *Gelsemium* for serous choroiditis. *Aurum* or *kali jod.* for plastic choroiditis. *Mercurius cor.* or *arsenicum* for ulcerative changes. *Mercurius cor.* or *plumbum* for albuminuric retinitis. *Calcearea carb.*, *carbo veg.* or *tellurium* in external otitis. *Psoricum* when there is a thin foetid discharge from the meatus. *Terebinthina*, *hepar*, *silicea*, *nitric acid*, *aurum mur.* or *calcearea phos.* in suppurative inflammation of the middle ear. *Elaps* in chronic suppuration of the middle ear accompanied with nasopharyngeal catarrh. *Muriatic acid* or *silicea* for otorrhœa and deafness.

Sulphur, *arsenicum* or *kali sulph.* may be administered during

the stage of desquamation to hasten the process and prevent sequels. *Baryta, sulphur* or *iodide of calcaria* should be thought of when induration of the cervical glands remains as a sequel.

Leading Indications.—The guiding symptoms for the different remedies may be compiled as follows:

Aconite.—Great dry heat and congestion of the skin. Fine prickling, as from needles, here and there. Rapid and full pulse with great restlessness and hurried respiration. Pain in the stomach with nausea and vomiting. Fear of being left alone. Anxious, frightened expression of the face. Redness of the soft palate and uvula (*bell.*). In plethoric persons.

Ailanthus.—General prostration, marked cerebral symptoms. Constant muttering delirium with sleeplessness and restlessness (*hyos.*). Intolerance of light. Hot, dry, harsh skin. Violent vomiting, with dry, parched tongue (*ars.*). The teeth are covered with sordes (*bapt., hyos.*). Livid eruption, more profuse on the forehead and face. Small, weak, rapid pulse. Congestion of the throat, the mucous membrane is dark colored, almost livid. Angry-looking ulcers in the throat, with fetid discharge. The glands of the neck are swollen and sensitive. Thin, watery, offensive diarrhea. Petechiæ. In malignant cases.

Ammonium carb.—Burning in the throat, down to the oesophagus (*canth.*). Putrid sore throat; gangrenous ulceration on the tonsils (*mur. acid.*). Hard swelling of the right parotid and cervical lymphatic glands. Tonsils enlarged and livid, and covered with a sticky, offensive exudation. Faintly developed eruption. Stertorous breathing; threatened paralysis of the brain, with excessive vomiting (*zincum*). Involuntary evacuations.

Apis mel.—High fever with chilliness from the slightest motion. Dull pain over the whole head relieved by pressure. Sopor with shrill, piercing shrieks. Great restlessness and nervous agitation. Tongue of a deep red color and covered with blisters (*rhus*). Dryness of the tongue, mouth and throat. Swelling and ulceration of the tonsils and palate (*merc.*). Stinging, smarting pain in the throat with difficulty in swallowing. Burning, pricking, smarting, itching sensations in the skin. Intensely deep red rash (*bell.*). Great soreness in the pit of the stomach when touched (*bry.*). Frequent, foul, involuntary, slimy and

bloody stools. Dyspnoea with great restlessness and trembling (*ars.*). Suppression of urine (*hyos.*, *opium*); albuminuria (*phos. acid*). Dropsical symptoms during desquamation.

Arsenicum.—Suppression or delay of the eruption with appearance of petechiæ. Great restlessness and extreme prostration. Vomiting and diarrhea. Dryness in the mouth with thirst for frequent sips of water (*bell.*, opp. *bry.*). Dry, brown, cracked tongue (*rhus*). Dryness and burning in the fauces and throat (*bell.*, *lach.*). Grinding of the teeth while asleep (*hell.*). Paroxysmal pains in the ears; profuse, thin, acrid discharge from the middle ear. Difficult breathing with great anguish. Urine dark colored and bloody, and passed with difficulty. Involuntary micturition (*hyos.*) Pulse frequent, hard and tense, or small, trembling and intermittent. Puffiness of the eyelids; œdematous swelling of the feet. Typhoid symptoms.

Arum.—Ichorous discharge from the nose, excoriating the nostrils and upper lip (*ars. iod.*, *merc. cqr.*). Soreness and ulceration of the mouth and fauces. Tongue red and sore with elevated papillæ. Swelling of the sub-maxillary glands. Scarlet eruption all over the body, with much itching and restlessness. Picking at the nose, lips and finger-nails. Spasmodic night cough (*hyos.*)

Aurum mur.—Obstinate foetid otorrhœa. Foetid mucus discharge from the nose. Caries of the nasal bones (*calc. carb.*). Painful swelling of the sub-maxillary glands.

Baptisia.—Great prostration with nervous restlessness, especially at night. Dull, stupefying headache (*gels.*). Nausea followed by vomiting. The eruption is more marked in the throat than upon the skin. Dark, putrid ulcers in the throat with difficult deglutition. Swelling of the parotid glands. Putrid, offensive breath with profuse salivation (*merc.*). Tongue covered with a yellowish-brown coating in the center, but red and shining at the edges. Typhoid symptoms.

Baryta carb.—Right parotid swollen and painful. Inflammation of the tonsils with tendency to suppuration (*hepar*). Chronic induration of the tonsils (*calc. carb.*). Swelling of the sub-maxillary glands (*merc.*). Ailments during and after desquamation. Adapted to scrofulous children.

Belladonna.—High fever and sore throat. Severe head symptoms with delirium. The head is hotter than other parts of the body (*arn.*). Drowsiness broken by starts and frightened outcries. Convulsive motions of the limbs. Smooth, scarlet-red eruption upon the skin. The skin is so hot that it imparts a burning sensation to the hand. Great dryness of the fauces and throat. Inflammation of the fauces and pharynx, with dark redness of the mucous membrane, and burning, stinging pains (*apis*). Face fiery red, or else pale, puffy and sunken. Tongue white in the center with red edges (*gels.*), or red all over with raised papillæ. Difficult deglutition; fluids swallowed return through the nose (*kali bich.*). Stomach and abdomen sensitive to the touch (*bry.*). Swelling of the neck, extremely painful to the touch and motion.

Bromine.—Swelling and induration of the sub-maxillary and left parotid glands (*conium*). Diphtheritic complications.

Bryonia.—Exceedingly irritable, everything makes him angry (*cham.*). Sensation as if sinking deep down in bed. Headache as if everything would press out of the forehead, worse on motion (*bell.*). Stitches in the throat when swallowing (*bell.*). Dry, parched lips. Delay or sudden retrocession of the eruption (*ipsecac*). Sensation of weight upon the chest with troublesome cough. Symptoms of pleuritis or meningitis (*hell.*). Dropsical symptoms. Constipation.

Calcareæ carb.—Sore throat with difficult deglutition. Swelling and induration of the glands of the neck (*baryta, merc.*). Aphthæ on the tonsils and roof of the mouth. Accumulation of mucus in the air passages. Purulent discharge from the ears (*hepar, merc.*). Swelling and redness of the lids, with nightly agglutination (*sulph.*). Ulceration of the nostrils. In scrofulous subjects.

Camphor.—Sudden retrocession of eruption with coldness of the skin, and great prostration (*cuprum*). Suffocative dyspnoea. Accumulation of mucus in the air passages (*ipsecac*). Great præcordial anxiety. Weak, scarcely perceptible pulse (*carbo veg.*). Cold, clammy sweat (*verat. alb.*). Suppression of urine.

Capsicum.—Burning and smarting in the throat, worse between the acts of deglutition. Burning vesicles on the tongue and mouth. Shivering and chilliness after drinking (*ars.*).

Painful swelling behind the ear. Caries of the mastoid process. Exalted sensibility of all the senses (*coffea*).

Carbolic acid.—Dusky red face, with a white circle around the mouth. Lips and tongue dry and covered with sordes. Fauces fiery red and swollen. Ulcerated patches on the lips and cheeks. Extremely foetid breath (*bapt.*). Liquids on being swallowed return through the nose. Weak or thready pulse. Excessive prostration with dizziness and headache. Eruption of a dark red color. Miliary vesicles all over the body. Urine light-colored and scanty. Involuntary discharge of mucus from the anus when urinating.

Carbo veg.—Restlessness and anxiety. Coldness of the breath and tongue (*verat. alb.*). Excessive prostration (*ars.*). Internal burning, wants to be fanned (*ars.*). Sticky, cold perspiration. Livid, purple appearance of eruption (*lach.*). Thread-like, scarcely perceptible pulse. Putrid sore throat. Ecchymoses.

Colchicum.—Vomiting, excited or renewed by every motion (*bry.*). Senses too acute; over affected by strong odors. Oedematous swelling of the legs and feet (*ars.*). Scanty discharge of bloody urine, looking almost like ink, and containing albumen. Rheumatic pains in the arms, extending into the fingers (*bry., caul.*).

Conium.—Swelling and induration of the parotid and submaxillary glands. In scrofulous individuals.

Cuprum acet.—Excessive nausea; vomiting relieved by drinking cold water (*bry.*). Convulsions precede the appearance, and follow the sudden retrocession of the eruption. Cold, bluish face with blue lips (*lach.*). The patient is afraid of every one; clings tightly to the nurse.

Digitalis.—Extreme debility with great anxiety (*aco.*). Thready, slow, intermittent pulse. Constant urging to urinate with scanty discharge. Dark, turbid urine. Nephritis after desquamation, with anasarca and cedema of the lungs.

Gelsemium.—Intense fever with frequent, soft, weak pulse. Heat with languor and drowsiness. Muttering delirium during sleep. Crimson flush of the face with suffused eyes. Great nervous excitement. The throat feels swelled or filled up, and

is diffusely red. Throbbing in the ears, pains shoot from the throat to the ears when swallowing. Great aversion to light, with dilatation of the pupils (*bell.*). Trembling and complete loss of muscular power.

Helleborus.—Face pale and œdematous. Urine scanty and dark colored; after settling it looks like coffee grounds. White, gelatinous stools with tenesmus. Sudden dropsical symptoms. In scrofulous children, and in children during dentition.

Hepar sulph.—Stitches in the throat extending to the ear (*gels., kali bich.*); worse on swallowing. Swelling of the parotid and sub-maxillary glands. Early decrease of the urinary secretions with traces of albumen and casts. Discharge of fetid pus from the ears. Ulcers and specks on the cornea.

Hyoscyamus.—Late appearance of the eruption, causing great nervous excitement. Constant desire to get out of bed. Red, sparkling, staring eyes (*bell.*). Constrictive sensations in the throat with inability to swallow (*bell.*). Clean, parched, dry tongue. Dark-red, flushed face. Muscular twitchings (*stram.*). Subsultus tendinum. Involuntary evacuations. Retention of urine (*opium*). Grating of the teeth (*apis, hell.*). Brownish spots or gangrenous vesicles on the body.

Ipecacuanha.—Constant nausea and vomiting of green bilious or slimy substance. Suppressed eruption. Violent itching of the skin. Dyspnoea.

Kali bich.—Throat purple, with small patches of tough, firmly adhering exudation all over the fauces. Pain extending to the right ear, when swallowing. Swelling of the parotid glands. Ulceration of the septum of the nose (*aurum*). Purulent inflammation of the whole nasal mucous membrane (*nit. acid*), Diphtheria.

Kali carb.—Inflammation and swelling of the right parotid gland. Mouth and tongue covered with painful burning vesicles (*merc. cor.*). Smell from the mouth like that of old cheese. Swelling between the eyebrows and upper lids like a little bag.

Kali permangan.—General and excessive prostration. Diphtheritic exudation all over the fauces. Extremely foetid breath. Great dyspnoea.

Lac caninum.—Pricking or cutting pains when swallowing

extending up to the ears. White ulcers on the tonsils; pharyngeal inflammation. Ulcers shine like silver gloss. Enlarged glands in scrofulous children.

Lachesis.—Great mental and physical exhaustion. Aggravation of all the symptoms after sleep (*apis*). Stupor and muttering delirium (*apis*). The eruption appears slowly, or turns black or bluish. Dry, red or black, cracked and bleeding tongue (*ars*). Hawking of mucus with dryness and rawness in the throat. The exudation commences on the left tonsil and spreads towards the right. External swelling of the neck and glands. External throat very sensitive to the touch. Black urine; watery, offensive stools (*ars*). Passive hemorrhages of dark, fluid blood. Typhoid symptoms.

Lachnanthes.—Heat and burning in the skin with sensation as if the eruption would appear. Circumscribed redness of the cheeks (*rhus*). Dryness and roughness of the throat, with pricking pain when swallowing. Stiffness of the neck after scarlet fever.

Lithium benzoate.—In post-scarlatinal dropsy, when the urine is dark, brownish-red, has a pungent odor, and there are present swelling of the joints, rheumatic pains and cardiac symptoms. Concretions in small joints.

Lycopodium.—Inflammation of the throat of a brownish-red color, with stitches during deglutition. Ulceration of the tonsils, beginning on the right and spreading to the left (*opp. lach.*). Swelling and suppuration of the tonsils (*hepar*). Swelling and sensitiveness of the sub-maxillary and cervical glands. Urine scanty, with or without sandy sediment. Grinding of the teeth even when fully awake. Secondary eruptions of dark-red blotches on the hands, thighs, back and face. Falling out of the hair (*graph.*, *phos.*).

Merc. cyanuret.—Excessive prostration. Marked redness of the fauces with difficulty of swallowing. Suppression of urine (*apis*). Engorgement of the parotid and sub-maxillary glands. Diphtheritic symptoms.

Mercurius.—Aphthæ in the mouth with profuse salivation. Ulcers upon the palate and tonsils, with ash-colored exudation. Dirty-yellow coating on the tongue. Swelling and inflammation

of the glands of the neck. Fœtid breath (*bapt.*). Nasal bones swollen and sensitive to the touch (*aurum*). Otitis with bloody, offensive discharge (*graph.*, *puls.*). Itching and restlessness, worse at night and after sweating.

Merc. iod. flavus.—Fauces bluish-red and ulcerated (*lach.*). Induration of the parotid and cervical glands and tonsils. Œdema of the neck and throat (*apis*). Sharp, throbbing, boring pains in the left ear. Tongue yellow with tip and edges clean and red. Fœtid discharge from the fauces and nares. Urine scanty and high-colored.

Merc. iod. ruber.—Livid, purplish patches in the throat. Exudation limited and easily detached; mostly on the left tonsil. Hawking up white and tough mucus. Swelling of the glands. Profuse salivation with pressure in the throat on swallowing. Diphtheritic symptoms.

Muriatic acid.—Marked redness all over the body, or else scanty eruption interspersed with petechiæ. The throat and fauces are dark-red and swollen, and covered with a grayish-white exudation. Excessive dryness of the lips, mouth and tongue. Acrid discharge from the nose, excoriating the nostrils and upper lip (*arum*, *merc. cor.*). Pulse rapid and very feeble, intermits every third beat (fourth beat, *vit. acid*). Complete prostration of the vital forces. Constant inclination to slide down in bed. Typhoid symptoms.

Nitric acid.—Soreness and swelling of the tonsils with difficult deglutition. Dryness and intense burning in the mouth and fauces. Fœtid odor from the mouth (*bapt.*, *merc.*). Profuse discharge of thin, purulent matter from the nostrils. Offensive, purulent discharge from the ear (*sil.*). Swelling of the parotid and sub-maxillary glands (*merc.*).—

Opium.—Drowsiness or sopor. Complete loss of consciousness (*hyos.*) with slow, stertorous breathing. Stupid sleeplessness with frightful visions. Bed feels hot, can hardly lie on it. Dryness of the throat with inability to swallow. Retention of urine. Picking at the bedclothes (*hyos.*). Impending cerebral paralysis.

Phosphorus.—Constant sleepiness. Low muttering delirium (*arn.*, *bapt.*, *rhus*). Contracted pupils (*opium*, *physostigma*).

Sudden disappearance of eruption with alarming chest symptoms. Difficulty of hearing, especially of the human voice (*silicea*). Dry, immovable tongue, cracked and covered with sordes (*ars.*, *verat. alb.*). Thirst with desire for very cold drinks (*rhus*). Burning sensation, causing a constant change of position. Œdema of the lids and around the eyes (*apis*, *rhus*). Brown urine, depositing a brick-dust sediment (*cinch.*, *lyc.*). Small, quick, easily compressed pulse. Ecchymoses. Falling off of the hair (*graph.*, *lyc.*)

Phosphoric acid.—Perfect indifference (*cinch.*, *lyc.*). Dryness of the mouth and throat (*nux*). Bleeding from the nose (*ham.*, *ledum*). Meteoristic distension of the abdomen with rumbling and gurgling. Involuntary, whitish-gray stools. Frequent, small, feeble pulse. Bluish-red spots on the parts upon which the patient lies. Ecchymoses.

Phytolacca.—Great prostration with violent pains in the head, back and extremities. Dryness of the throat with swelling of the tonsils (*bell.*). Dark red color of the fauces (*bapt.*). Feeling as of a lump in the throat, and great pain at the root of the tongue when swallowing (*bell.*, *lach.*). Thick, white and yellow exudation upon the fauces (*kali bich.*). Shooting pains through both ears when swallowing. Hardness of the glands in the right side of the neck. Rheumatic pains in the extremities. The eruption appears dry and shriveled; the skin feels dry and harsh, like brown paper. Diphtheritic symptoms.

Rhus tox.—Great restlessness and uneasiness (*ars.*). Active delirium and great prostration. Dry, red, cracked tongue (*bapt.*, *bell.*). Redness of the tip of the tongue in the shape of a triangle. Dark red, livid eruption with increasing fever and great nocturnal restlessness. Ichorous discharge from the nostrils. Swelling and induration of the parotid and sub-maxillary glands. Great thirst for cold drinks (*phos.*), especially cold milk. Involuntary foetid stools during sleep. Rheumatic pains in the limbs and joints. Itching over the whole body (*sulphur*). Vesicular eruption with itching and burning. Typhoid symptoms.

Secale.—Constant sighing. Great prostration and extreme restlessness. Mania with inclination to bite (*bell.*, *siram.*). Aversion to being covered. Fear of death (*ars.*). Brown or blackish tongue (*ars.*). Violent, unquenchable thirst. Invol-

untary diarrhea (*hyos.*). Suppression of urine. Bloody and albuminous urine (*terebinth.*). Extensive ecchymoses.

Silicea.—Induration of glands from tardy convalescence. Swelling and suppuration of the parotid gland. Caries of the mastoid process. Otalgia with drawing, stitching pains (*puls.*). Itching in Eustachian tubes and ears, especially when swallowing. Great sensitiveness to cold air (*sepia*), takes cold easily. Disposition to boils. In scrofulous children.

Stramonium.—Convulsions excited by touch, or from looking at bright, shining objects. Coppery-red eruption with heat, dryness and itching of the skin. Great dryness of the throat. Violent thirst, especially for sour drinks (*bry.*, *secale*). Yellowish-brown coating on the tongue, which is dry in the center (*bapt.*). Black stools which smell like carrion (*ars.*, *carbo. veg.*). Constant restlessness with jerking motions of the whole body. Suppression of urine.

Sulphur.—During the stage of desquamation, and in slowly progressing cases. In scrofulous children.

Terebinthina.—Headache with intense pressure and fullness of the head. Slowly appearing eruption. Tongue red, smooth and glossy. Great drowsiness. Vomiting of mucus, bile or blood, aggravated by drinking. Burning and drawing from the right kidney to the hip. Urine smoky and turbid, depositing a sediment like coffee grounds. Albuminuria and hæmaturia. Strangury (*canth.*). Intestinal catarrh and diarrhea. Anasarca (*hell.*). Ascites (*apocynum can.*).

Veratrum vir.—Muttering delirium. Restless sleep with dreams of being drowned. Severe frontal headache with vomiting. Red streaks in the middle of the tongue; yellow edges. Intense fever with flushed face and convulsive twitchings of the facial muscles. Sudden spasms with nausea and vomiting and great prostration. The child trembles as if frightened and on the verge of spasms. Convulsions precede the outbreak of the eruption. Irregular, hard, frequent pulse. Oppression of the chest with slow, labored breathing. Dark, turbid, foetid urine. Rheumatism.

Zincum.—Retrocession of the eruption (*cuprum*). Threatened paralysis of the brain. Twitching of the hands and feet.

Dryness of the throat with accumulation of mucus in the posterior nares. Small, filiform pulse. Involuntary evacuations.

HYGIENIC AND DIETETIC TREATMENT.

The sick room should be large and well ventilated, and the temperature should be kept between 65° Fahr. and 70° Fahr. All superfluous articles of furniture and everything that is liable to absorb and retain contagion should be removed from the apartment. Throughout the whole course of the disease quietude and the strictest cleanliness should be observed. The bed and room should be sprinkled with Platt's chlorides, diluted one part to ten, or some other disinfectant. Sheets saturated with some disinfecting solution should be hung up in the door and window ways of the apartment. The bed and body linen should be changed daily, and immediately thrown into a vessel containing a solution of carbolic acid, before being removed from the room. The discharges from the bowels or kidneys should be received into vessels charged with disinfectants, and immediately disposed of.

Cool or cold drinks in small amounts and at short intervals are beneficial as well as grateful to the patient. Pieces of ice held in the mouth afford the most marked relief when throat complications are severe. The *diet* should, as a rule, be liquid, and may consist of milk, milk and lime water, beef tea (p. 193), buttermilk, koumyssi, clam broth, light soups, or farinaceous food. If exhaustion is great, brandy with milk (p. 306), beef or chicken tea and wine whey (p. 194) may be given. When diphtheria occurs as a complication, brandy or whisky, should be administered in teaspoonful doses every hour or two, or until the system becomes saturated.

The local treatment of the throat consists in the early application of a cold water compress to the front of the neck from ear to ear. When there is considerable infiltration of the throat, hot applications externally and steam inhalations, warm gargles, or sprays internally are of the greatest benefit. If exudation occurs, carbolized lime water spray (cold)—carbolic acid three drops, lime water one ounce—used three or four times in twenty-four hours, for three or four minutes at a time, is exceedingly efficacious. Viscous secretions which collect in the fauces should be removed with a camel's hair brush. When diphtheria and

scarlet fever are combined, a solution of potassium permanganate or of liquor potassæ and lime water—one-half of a drachm to four ounces—administered in the form of spray by the atomizer, should be used. When there is enormous swelling of the glands below and behind the angle of the jaw, or when coryza is present, the nasal passages should be cleansed by means of a camel's hair brush, or by the injection of a mildly carbolized wash, and then freely anointed. When there is much purulent discharge from the meatus, frequent syringing with warm water should be employed. When suppuration of the external glands or tissues about the neck cannot be prevented, hot fomentations should be resorted to, and the abscesses opened early.

When in the early part of the disease the temperature runs up to 104° Fahr., the external use of cool or tepid water should be resorted to. The water may be employed either by immersion in a bath ten degrees below that of the patient, by wrapping the patient in a sheet wrung out in water at a temperature of 70° Fahr., or by sponging the surface with cold or tepid water. Cloths wrung out of water at a temperature of 85° Fahr. or 90° Fahr., applied to the surface, and changed every hour or two, are frequently used instead of either the full bath or the pack. As in typhus fever, when the full bath is used the patient must be kept in the bath until his temperature falls to 101° Fahr., then taken out, quickly dried and placed in bed. As soon as the temperature rises to 104° Fahr. the patient must receive another bath. The best results, however, are generally obtained from either the *wet sheet*, the *sponging* or the application of *wet cloths*.

When there is much itching and burning of the skin, the surface should be gently anointed with mildly carbolized vaseline. During desquamation, night and morning inunctions preceded by warm baths, are highly beneficial.

When the kidneys are involved, large, hot poultices prove efficacious. Daily microscopical and chemical examination of the urine should be instituted. If œdema occurs, the patient should be given a hot bath or a moist warm pack for at least two hours, then removed to a warm room with the temperature at 72° Fahr. or 75° Fahr., and kept in bed with sufficient covering to induce constant, gentle perspiration. Should the œdema become ex-

cessive, small punctures may be made in the lower part of the legs to favor the removal of the fluid.

All exposure to cold should be carefully avoided, and the patient should not be allowed to leave his room for three or four weeks at least from the beginning of the attack.

During convalescence, warm clothing should be worn.

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